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Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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Vol. 13 No. 2 **February 1960**

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U. S. Department of the Interior
Washington D. C.

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FRED A. SEATON, SECRETARY

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Commercial Fisheries Abstracts

DIVISION OF INDUSTRIAL RESEARCH AND SERVICES
BUREAU OF COMMERCIAL FISHERIES

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Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

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1 Fish by species
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9 Miscellaneous

Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget November 23, 1956.

0.34 ACID MUCOPOLYSACCHARIDE OF THE CRUSTACEAN CUTICLE

Meenakshi, V. R. and Scheer, Bradley T. (University of Oregon, Eugene)
Science 130, 1189-1190 (October 30, 1959)

Introduction.--The occurrence of acid mucopolysaccharides in integumentary and skeletal tissues has been reported frequently in recent years. The present report provides recent chemical evidence of the occurrence of such a substance in the integument and in the digestive gland of the crab, Hemigrapsus nudus. Trim (1941) reported the occurrence of a nonchitin carbohydrate in the arthropod cuticle. Travis (1958), using histochemical methods, demonstrated the presence of a mucopolysaccharide in the integument and in the digestive gland of lobsters. Hu (1958), in his recent study, observed that a polysaccharide other than glycogen is present in H. nudus. Hydrolysis of the polysaccharide fraction separated by Hu yielded fucose, galactose, and glucose. The authors decided to study the distribution of this polysaccharide in the crab, with special reference to the cuticle to learn if it was similar in distribution to that observed by Trim or Travis.

Experimental.--The crabs were collected from Coos Bay in the vicinity of Charleston, Oregon, while they were in the C_4 stage of the intermoult cycle. The cuticle was prepared according to the method used by Frankel and Rudall (1949) for insects. The polysaccharides were precipitated with alcohol from alkali extracts of the powdered cuticle and of the fresh digestive gland and separated by paper electrophoresis at pH 5, as suggested by Bera et al. (1955). A Karler-Kirk curtain-electrophoresis apparatus was used. The polysaccharide was stained on the paper by the method of Koiw and Gronwall (1952) and of Hammerman (1955). Quantitative estimation of the polysaccharides after electrophoretic separation was made by the anthrone method of Roe (1955). The methods adopted by Hu (1958) were followed for the hydrolysis of the polysaccharide and the analysis of the sugars.

Results.--The digestive gland contains--besides glycogen--an acid mucopolysaccharide that gives

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 ABSTRACTER: Martin Heerdt

2.114 A CONTROLLABLE PITCH PROPELLER GETS FIRST TEST ON U. S. TRAWLER IN SHRIMP INDUSTRY

Anonymous
Fish Boat 4, 26-27 (September 1959)

A 62-foot shrimp trawler built in St. Augustine, Florida, is reported to be the first fishing boat in the United States to be equipped with a controllable pitch propeller.

The controllable pitch propeller is as common in European fishing vessels as are fixed-pitch propellers in the United States. The bronze blades of the three-blade propeller can be pivoted on the hub to alter the pitch. This adjustment can be made simply and easily by the skipper in the wheelhouse. This makes for maximum propeller efficiency in running, towing a trawl, or weathering a storm.

Through a control linkage, the hand wheel in the pilot house causes a push rod to work fore and aft through a hole bored the length of the propeller shaft to the hub. The push rod moves a heavy triangular bronze "spider" on which the three propeller blades pivot. A pitch indicator gauge is located in the wheelhouse to assist the skipper in making adjustments. The gear box that controls the pitch-changing mechanism has a crank base that is filled with SAE 30 oil. The hub of the propeller is packed with soft grease. The rubber stern bearing and the nylon stuffing-box bearings are lubricated with water.

The propeller installed on the Florida boat is designed primarily for fishing boats. In the hub of the propeller is a heavy triangular block of bronze on which the blades swivel. The overall design is so simple that the three blades can be removed and changed in the dry dock in less than an hour.

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 ABSTRACTER: Kathryn L. Osterhaug

0.5 NUTRITION AND METABOLISM OF MARINE BACTERIA. III. THE RELATION OF SODIUM AND POTASSIUM TO GROWTH

MacLeod, Robert A. and Onofrey, E. (Fisheries Research Board of Canada, Technological Station, Vancouver, B. C.)
Studies 1958, from the Stations of the Fisheries Research Board of Canada, FRB No. 516 (1959) (Ottawa, Canada)

For the three marine bacteria investigated, a Flavorbacterium, a Corynebacterium, and a Mycoplana, the levels of sodium ion (Na^+) and potassium ion (K^+) in the medium were found to affect both the rate and the extent of growth. Only one one-hundredth as much K^+ as Na^+ was required. Neither lithium ion (Li^+), rubidium ion (Rb^+), nor caesium ion (Cs^+) permitted the growth of any of the organisms when added in place of either Na^+ or K^+. Cs^+ was found to be inhibitory for two of the organisms tested, and evidence was obtained for antagonism between K^+ and Cs^+.

When growth of the organisms was limited by the level of either Na^+ or K^+ in the medium, analysis of the supernatant medium, after growth had ceased, revealed that considerably more ions remained in the medium than were taken up by the cells.

At suboptimum and optimum concentrations of Na^+ for growth, intercellular and extracellular Na^+ concentrations were nearly the same; whereas at the level of Na^+ in sea water the extracellular Na^+ concentration exceeded the intracellular Na^+ concentration. If K^+ was present in the medium at the level found in sea water, the cells contained more K^+ per unit volume than did the medium.

Attention has been drawn to a similarity between marine bacterial cells and animal cells as regards both the relationship between intracellular and extracellular Na^+ and K^+ levels and the

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 Authors' summary

2.114 NOZZLE PROPELLER TESTED FOR TRAWLING

Van Manen, J. D.; Vossers, C.; and Rijken, H.
Canadian Fisherman 46, 14, 16 (November 1959)

After boatmen found that the towing capability of tugs is improved by the use of a nozzle propeller, a steadily increasing number of fishing trawlers were fitted with nozzle arrangements. People who use the nozzle propellers on their boats claim that it gives increased resistance in a head seas and that it increases the damping, thus reducing pitch. In order to verify these claims, a model of a typical trawler was tested in the Sea-Keeping Laboratory of the Netherlands Ship Model Basin (1) with and without a nozzle propeller and (2) in still water and in waves.

Experimental.--A paraffin-wax model of a trawler, scale 1:13, with bilge keels was used for the tests. The propellers were designed for trawling at 5 knots with 940 SHP (metric) and a propeller r.p.m. of 160. The dimensions of the nozzle propeller were chosen in accordance with the ideas of Manen and Superina (1959), and Kaplan-type blades were selected. The diameter of the nozzle propeller was 93 percent of that of the normal propeller.

The still-water trawling tests revealed that the actual resulting r.p.m. for the normal propeller was 160.5 and for the nozzle propeller 157.3. The model was tested at 0 to 13 knots, free running and 4 to 6 knots, trawling. Trawling was simulated by applying a resistance form to the model. The recordings taken were (a) pitch angle (through the center of gravity), (b) heave (of the center of gravity), (c) angle of roll (through the center of gravity), (d) maximum emergence and submergence of bow in relation to the waves, (e) acceleration at bow and stern, (f) shaft torque, (g) r.p.m., and (h) speed.

In still water, at 5 knots, the nozzle propeller gave a pull of 12.04 tons, whereas the normal propeller produced a pull of 10.83 tons. The same values were found in following and quartering waves. In head seas, however, the differences between the propellers became smaller; under some conditions

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 ABSTRACTER: Kathryn L. Osterhaug

MUCOPOLYSACCHARIDE IN CRAB CUTICLE

NUTRITION OF MARINE BACTERIA

CONTROLLABLE PITCH PROPELLER

NOZZLE PROPELLER FOR TRAWLER

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quantitative growth requirements of both types of cells for these ions. The literature suggests that both terrestrial bacteria and halophilic bacteria have evolved from marine bacteria, the former by developing an ability to grow without Na^+ and the latter by becoming adapted to growth in the presence of high concentrations of salt.

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it was even found that the nozzle propeller gave a lower pull or a lower speed, or required more SHP. This was contrary to expectations. One explanation might be the greater sensitivity of the nozzle propeller to changes in the direction of intake velocity that occur with heavy pitching and heaving.

Subsequent tests were carried out with two rudders, each placed a quarter of the nozzle's diameter from the center line. Although very good steering resulted, there was no improvement in the nozzle propeller's performance when trawling in head seas. In still water, the nozzle propeller required higher SHP, which was to be expected, since the propellers were designed for heavy pulls; thus in the free-running condition with a small load, the nozzle propeller would be at a disadvantage. In head seas, especially in high waves with a length equal to the ship's length or longer, where the resistance increase is high, the difference between the propellers became smaller, and in some conditions the nozzle propeller required less SHP.

In general, the speed of the nozzle propeller is less sensitive to changes in load, which is of advantage for some types of propulsion machinery. When the design situation is at 160.5 r.p.m. for the normal, and 157.3 r.p.m. for the nozzle propeller, a higher sailing speed can be obtained with the nozzle propeller, although it will require more SHP.

Summary.--The tests showed that for a ship trawling in still water the nozzle propeller increases pull considerably. This remains true in following and quartering waves. When trawling in head seas, however, the nozzle propeller is unfavorable compared with the normal propeller because it causes either a decrease in speed, a weaker pull, or an increase in SHP.

In the free running condition in still water, the nozzle propeller requires a higher SHP, although at a lower number of revolutions, which is advantageous for certain types of propulsion machinery in attaining a higher free-running speed. The same applies to the free-running conditions in following and quartering seas.

In the free-running condition in head seas, the differences between the propellers become smaller and in high waves with a length equal to the ship's length the nozzle propeller is better. The influence of the nozzle propeller on the amplitude of pitch and heave and the wetness of the foredeck is negligible. The nozzle propeller does, however, reduce the vertical acceleration at the stern.

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a positive toluidine blue stain on paper. During electrophoresis on paper the acid mucopolysaccharide moves to the cathode and is readily separated from glycogen.

Hydrolysis of the polysaccharide yielded fucose, galactose, and glucose; however, glucose was more abundant than the other two sugars, as was observed by Hu (1958). The cuticle also showed the presence of an acid mucopolysaccharide that yielded fucose, galactose, and glucose on hydrolysis and appeared to be identical with that of the digestive gland. Glycogen was not demonstrable in the cuticle. If it was present at all, the amount was negligible as compared with the amount of acid mucopolysaccharide.

On a dry weight basis, the cuticle averaged 937 milligrams of acid mucopolysaccharide per 100 grams. About 10 to 25 percent of the total polysaccharide in the digestive gland is in the form of acid mucopolysaccharide.

Discussion.--A correlation has been established recently between calcification in bone and cartilage and the distribution of acid mucopolysaccharide. This correlation suggests that calcium-binding capacity is due to the presence of the acid mucopolysaccharide. Studies on various types of human tissues have led to the conclusion that a mucopolysaccharide with specific properties is involved in almost all biological calcification. In the study of the organic matrix of the shell of the hen's egg, Simkin and Tyler (1958) suggest that both acid mucopolysaccharide and protein components of the egg shell are vitally important to the mechanism of calcification. Travis (1957) has observed that the mucopolysaccharide shows some cyclic changes in the digestive gland and in the integument during the intermoult stages. On the basis of these observations, the authors believe that the presence of acid mucopolysaccharide in the cuticle of the crab may have an important role in the calcification of the cuticle.

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A single blade of the propeller can be removed and exchanged, which is a job that could be done by a diver.

At present a controllable pitch propeller costs about 40 percent more than a comparable fixed-pitch propeller. Engineering changes, however, may lower this cost.

2.116 LOCATING FISH WITH ECHO SOUNDER

Eide, Ralph (Chief Engineer, Simonsen Radio A/S, Oslo, Norway)
Pacific Fisherman 57, 18, 21, 23-24 (October 1959)

In 1935 off the Loften Islands, the Norwegian ichthyologist, Oscar Sund, aboard the research vessel Johan Hjort, was the first to use an echo sounder to locate fish.

Since World War II, echo sounders have become common instruments on fishing vessels. Until recently, however, the instrument has been used mainly for determining bottom characteristics and for locating shoals of fish in shallow water. The white line recorder marks a step forward in the development of a versatile and practical echo sounder for locating fish. Although the use of the cathode-ray tube helps to overcome the difficulties of distinguishing fish from the sea bed at great depths, a paper recorder presentation is preferable in order to get a precise idea of the shoal by retaining a record of the soundings.

Remarkable results have been achieved by the Norwegian research vessel G. O. Sars. These results may be attributed to increased sensitivity, better concentration of beam, and a new method of presentation which shows the sea bed as a thin dark line followed by a white line or white shadow. Anything above the dark line is something other than the sea bed, for instance fish or vegetation.

Sound beam and transmitter pulse.--The heart of the echo sounder is the transducer. The sound it emits is directed as a beam through the sea. The shape of the beam is determined by the size and shape of the transducer. The white line recorder produces a beam that is narrow along ships and wide athwart ships. The transducer also acts as a microphone to receive sound echoes. A sound duration of .001 second produces a sound pulse in the water 1.5 meters long. The area covered by a beam of sound increases with depth. The decrease in sensitivity is the square of the increase in

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 ABSTRACTER: Richard L. McNeely

2.117 ALUMINUM GILLNETTERS PROVE FAST, SAFE IN ALASKA SERVICE

Anonymous
Fish Boat 4, 25, 43 (October 1959)

Introduction.--The launching of ten welded-aluminum gillnetters for service in the Alaska salmon fishery was previously announced. The 32-foot boats were fabricated of aluminum alloys specially developed for durability and resistance to salt-water corrosion and were powered by 165-horsepower gasoline engines designed for speeds up to 15 knots. Each boat was equipped with a hydraulic net reel engineered specifically for use on gillnet reels. In the present article, the performance of the vessels in actual service on the fishing grounds is reported.

Performance.--The fishermen who tested the use of these boats suggested only minor changes, and all felt the hull design, cabin design, layout of the boat, and handling characteristics should not be changed. Many of the aluminum vessels were caught in the middle of a storm with wind velocity estimated at 50 knots and experienced no difficulty. This proved to the fishermen that the boats are safe under extremely bad weather conditions.

The salmon run was below normal during the season, and the aluminum boats made many catches that could not be equaled by other boats with the customary 7- to 8-knot speed. They frequently sped to fish runs where they made substantial catches before the closing period designated by regulations. Time spent lying along fish scows was cut considerably by the ease of unloading and by the shorter time needed for washdowns.

When fully loaded, the boats still maintained a safe, 8-inch freeboard. A minimum of strain was put on the nets when these light gillnetters were fishing in rough weather. The fish hold was easy to clean, and along with the rest of the hull area, required a minimum of maintenance.

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 ABSTRACTER: June H. Olden

2.140 THE EFFECT OF DYEING ON THE EFFICIENCY OF GILL NETS AND LONG LINES MADE OF PERLON MONOFILAMENT

Kajewski, G.
Fischereiforschung 1, No. 1, p. 19 (Aug. 1958) (In German)
World Fisheries Abstracts 10, 21-22 (May-June 1959)

The effect of color on the efficiency of fishing gear on Baltic cod, pike, roach, mackerel and garfish was tested with gill nets made of Perlon monofilaments. The nets were used on fishing grounds with rich aquatic vegetation and also on grounds without any vegetation. The most visible material always produced the worst catches.

With gill nets, softness also is essential but it differs for the various species of fish. For the efficiency of the net the softness is not as crucial as the color. It was impossible to find a single color of universal application. The contrast of the color to the surroundings seems to be the most important. Thus, one material may yield good results on one fishing grounds, but fail elsewhere. Pink and red dyed materials produce good catches of pike, cod, roach, and eel on rough grounds. On sandy grounds, however, the catches decreased below average and failed completely with these colors in the open water. The material dyed light blue gave exactly the opposite results. Conditions of light, turbidity of the water, state of the fishing grounds and their depth also add to the effect the color has on the efficiency of the gear.

It is remarkable that nets or lines made of undyed monofilament Perlon caught less fish than some dyed lines or nets. However, monofilament Perlon always worked better than cotton, no matter which color was chosen for the two materials. Based on these experiments, a list of the most useful colors is given. For instance, it is recommended that pink or red be used for gill nets for taking Baltic cod; light blue, light or dark green for mackerel and garfish, depending on the depth.

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 ABSTRACTER: A. von Brandt

2.1476 GILLNETTING OPERATIONS ON THE GREAT LAKES

Colvin, Thomas E.
National Fisherman 40, 9, 32 (October 1959)

Gillnets are used in all of the Great Lakes. Gillnets are designed to permit the head of the fish to pass through the mesh, but not the body, and the fish is caught by the gills.

Gillnets are set on the bottom at depths that vary with the season, the species of fish being caught, and the locality of the fishing grounds. The length of the nets vary from 1,000 to 30,000 feet and they are 5 to 6 feet in depth. The lengths of netting are made up onto boxes, each section of netting measures from 1,000 to 2,000 feet and is equipped with floats and leads. The floats, which are made either of plastic or aluminum, are about 4 inches in length by 2 inches in diameter and are spaced from 7 to 9 feet apart. Opposite each float is a 6-ounce lead to sink the net. The leads are cylindrical in shape, are about 4 inches long, and are hollow in the center.

The nets usually are made of nylon and the mesh size usually is about $2\frac{1}{2}$ inches, although this varies considerably from state to state. Float and lead lines may be of linen, cotton, or nylon.

Before setting their gear, the fishermen stretch the nets on drying reels and stow them in boxes with the leads arranged and stacked in tiers along the right-hand side of the box. The floats are stowed in tiers throughout the remainder of the box. The fishermen take care to see that each float corresponds with its lead so that the gear will run free during the setting operation.

When the fishing grounds are reached the fishermen make ready two buoy anchors and two buoy lines. The first buoy and its anchor are dropped with a suitable length of bridle to accommodate the depth of the water. After the buoy is in place and anchored, the boat moves ahead slowly as the net is set. Each man picks up a lead and a float from the box and throws them clear of the stern. When each box is nearly empty another box is moved into place and the ends of the nets are made fast so that the setting can go on without interruption. When the desired length of net is in the water, the second bridle is made fast and attached to the second buoy and anchor.

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 ABSTRACTER: Kathryn L. Osterhaug

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The decks of these vessels are covered with nonskid paint, and living quarters have an insulation coating. Otherwise, the boats are of untreated aluminum, which eliminates such maintenance problems as frequent painting and rot-prevention treatments. The aluminum boats also are not subject to seam damage.

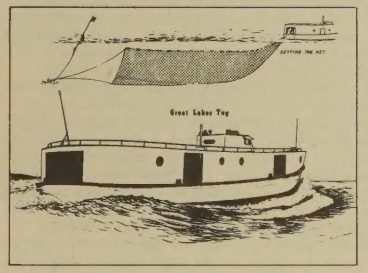
Fishermen report that because of speed, seaworthiness, hold capacity (27,000 pounds), and fast turn-around, these boats have the ability to increase fish production during heavy fish runs by 25 percent over that of conventional gillnetters.

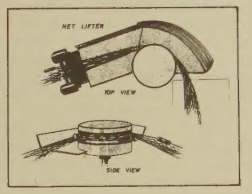
2.1476

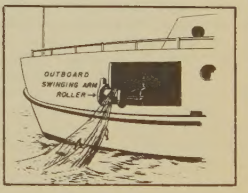
The reverse process is used when hauling, but this operation is carried out from the forward section of the boat rather than from the stern. A trough and a roller extend over the side of the hull from a forward opening for about 30 inches. Large guides on the end of the roller prevent the net from slipping off as it passes to a hauling drum by way of the trough.

If the net is heavily loaded with fish it is common practice to leave the fish in the nets and stow the nets in boxes. When the catch of fish is light, however, the fish are picked from the nets as they are hauled aboard.

Hauling usually takes place after all the dry nets have been set.







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depth. This is important in interpreting echograms.

Vertical resolution.--In the case of a sound pulse 1.5 meters long, fish closer together vertically than .75 meters will coalesce. The faster the stylus moves over the paper, the better are the chances for distinguishing individual echoes. Limitations imposed by vertical resolution allow fish just off the bottom to coalesce with the bottom echo.

Fish echoes normally are not strong enough to trigger the blocking mechanism that produces the white line, therefore, fish near the bottom show up as increased thickness of the thin sea-bed line. Unusually dense shoals in shallow water will sometimes produce blocking, but this is easily controlled by adjusting the sensitivity.

Dead field near sea bed.--Although blocking of the bottom echo represents an improvement in recording technique, it does not allow recording of all the fish near the bottom. The reason is a "dead" field within the sound beam. At a depth of 200 meters, one-half of all fish spaced 2 meters distance from a level sea bed will not be recorded even though they are reached by the sound beam. When the sea bed is uneven or lumpy the dead field increases. When fish are actually resting or feeding on the bottom, only an insignificant part of the total incidence is likely to be recorded.

Recording at different speeds.--The appearance of the echogram is determined to a large extent by the speed of the vessel. Single fish echoes show up as long lines when the vessel is stationary, as curved lines at slow speeds and as dots or points at high speed.

Interpreting the echograms.--At high sensitivity it is important to be able to recognize irrelevant recordings of plankton and other small organisms. Diffuse and foggy appearing traces, which are easily eliminated by reducing sensitivity, are usually irrelevant recordings. Cod and haddock appear in shoals dense enough to cause blocking. Irrelevant recordings are rarely strong enough to cause blocking.

Intrepretation of echograms is a skill that can come only from personal experience.

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For lines for taking Baltic cod light blue is recommended, for taking mackerel and garfish also light blue, light or dark green.

2.140 COMMERCIAL FISHING VESSELS AND GEAR

Sundstrom, Gustaf T. (Bureau of Commercial Fisheries, Washington 25, D. C.)
Fish and Wildlife Circular 48, 48 pp. (1957) (United States Government Printing Office, Washington 25, D. C.)

The United States with its long coastline on two oceans, the great inland lakes, and large rivers, is among the leading nations of the world concerned with commercial fishing. The gear and fishing vessels are naturally of a great variety, but the hook, the net, and the trap are still, as they have been for centuries, the main types of gear used. Hooks by the hundreds are now used on one line, called the long-line; nets have been developed into purse seines, beam and otter trawls, and mile-long gill nets; traps have been enlarged into the gigantic traps for salmon and the extensive Great Lakes trap nets. Sail and steam have given way to gasoline and Diesel power. Shipbuilding techniques and fishing experiences are reflected in the modern fishing vessel. When the fishing grounds are located far from the home port, freezing facilities have sometimes been installed aboard the vessel. Most of the larger fishing vessels are now equipped with electronic navigation and fish-finding devices. A recent development in fishing gear is the power block used in the salmon fisheries. The midwater trawl has been successfully introduced into some European fisheries within the last few years, but this gear is still in the experimental stage in America.

A selection of some of the most important types of fishing gear and vessels in use today, in the United States and Alaska, is illustrated in this leaflet. Descriptions of representative types of fishing vessels are also included. General range of length, beam, draft, net tonnage, construction, engine, refrigeration, speed, average crew, length of trip and convertibility, are indicated. The main fishing areas are shown on maps, and include only United States fishing activities.

This circular is for sale by the Superintendent of Documents, U. S. Government Printing Office,

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 ABSTRACTER: Gustaf T. Sundstrom

2.15 THE UTILIZING OF TRASH FISH--A NEW INDUSTRY IN THE MAKING

Robas, John S.
Fish Boat 4, 33-35, 38 (October 1959)

Introduction. -- The author reports that as margins of profit in the Southern trawler fleet decline, many vessel owners are becoming interested in the utilization of trash fish. This article, the first in a series of seven, deals with the production of industrial fish by the trawler fleet.

Possibilities for use of industrial fish. --Many trawlers remain at the dock during seasons when shrimp are scarce or prices are poor. Utilization of trash fish, if markets for them existed, would allow the vessels to keep busy more days per year and would provide a supplemental income, which the trawlers need. Isolated cases have shown the desirability of utilizing trash fish. For example, the extensive trash fishery in the Gulf around Pascagoula, Mississippi, is devoted mainly to trash fishing, the catching of shrimp being only a sideline. The practice of saving trash fish is not generally followed because of (1) crew disinterest, (2) lack of market except in isolated instances, (3) disinterest by large reduction plants to whom the tonnages involved look small, and (4) past general prosperity of the shrimp industry, to whom trash fishing may not seem worth the effort.

Catching. --It is felt that aggressive fishermen can increase production of trash fish manyfold, without reducing the catch of shrimp, by relatively simple and inexpensive changes in gear.

Stowing. --The best procedure for stowing fish is to reserve one or more bins in the fish hold for trash fish and install 12-inch or larger deck plates over these bins for ease in shoveling the catch below. A fish pump or mechanical bucket unloader would be required for discharging the cargo, since manual unloading is slow, heavy work. It is possible that before long trash boats will be stowing

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 ABSTRACTER: June H. Olden

2.3 SANITATION AND PROCESSING OPERATIONS

Anonymous
Canadian Fisherman 46, 21-28 (October 1959)

The only way to produce a product of top quality is to process it efficiently from high-quality raw materials under sanitary conditions. Sanitation in the food-producing industries embraces a far wider field than is commonly realized. Sanitation may be defined as the control of those factors that combine to facilitate the production of an attractive and safe product.

The attractiveness of a product contributes to its acceptability to the customer. During recent years millions have been spent on the design of packages and labels. Attractiveness in its broader sense, however, goes far beyond the eye appeal of packages and labels; it includes the appearance and quality of the product itself.

The appearance and quality of a product are directly dependent upon the sanitary practices in the processing plant. In the food producing industry, sanitation may be considered under two aspects. The first deals with the prevention of public health hazards and the second with the prevention of contamination with extraneous materials.

Health hazards. --Improper sanitation in food processing may permit or cause food to be a vector for the transmission of diseases, a cause of food poisoning, or a carrier of toxic materials.

The water supply is of utmost importance in a sanitary program. In the past, polluted water supplies contributed to numerous outbreaks of gastro-intestinal diseases. Such outbreaks now are practically unknown in well-organized communities. By the nature of the industry, many fish-processing plants are remote from approved municipal water supplies. In order to ensure a safe supply,

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 ABSTRACTER: Kathryn L. Osterhaug

3.10 SOME PRESSING PROBLEMS UNDER THE FOOD ADDITIVES AMENDMENT OF 1958

Oser, Bernard L. (Food and Drug Research Laboratories, Inc., Maurice Avenue at 58th Street, Maspeth 78, New York City, New York)
Food Technology 13, 607-608, 609 (November 1959)

Introduction. --The Food Additives Amendment of 1958 is regarded as the most significant act of legislation affecting the technology of food production and distribution since the passage of the Federal Food, Drug, and Cosmetic Act of 1938. With respect to additives in use prior to January 1, 1958, the mandatory provisions of the Amendment will not become effective until March 5, 1960. At present, the concern of industry and of the Food and Drug Administration as well, is directed largely toward the status of the so-called "old" food additives rather than toward new food additives.

Because the language of the Amendment is not clear and unequivocal, some companies prefer to consult the Food and Drug Administration with regard to the status of every substance used in the processing or packaging of food. Even substances believed to be exempt from the legal definition by virtue of prior government sanction or approval under the food laws are in danger of losing approval when reappraised according to present-day criteria.

For these reasons, there is an understandable reluctance on the part of many companies to present such questions to the Food and Drug Administration and an inclination to rely on their own experts' appraisal of safety. This is entirely within their right under the new Amendment. In view of the uncertainties as to the status of additives that have a long history of use, chemical manufacturers and suppliers are besieged with requests to furnish documentary evidence of the acceptability, under the new Amendment, of substances sold for use as food additives.

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 ABSTRACTER: Martin Heerdt

2.15 (Cross Reference: 6.0)

their catch in chilled brine tanks in the hold, cooled by a refrigeration system running off the main engine, as is done on the Pacific Coast.

Methods of unloading. --The quickest and simplest way to unload a shrimp trawler that carries her catch on deck is by using a pressure hose, which washes the fish off the deck, through the scupper, and into a steel tank lying between the trawler and the dock.

Another method of unloading a trawler, particularly one that stows her catch below deck, is by using a fish pump. Hoses are used to wash the fish into the pump, and the fish are pumped out quickly.

Still another method is to load the trash fish into ordinary wooden shrimp boxes and use a simple winch to pick the boxes off the deck of the trawler. The author reports that although this method requires little investment, it is neither quick nor efficient.

A bucket elevator can be used for unloading trash fish, but the fish hold should be hosed down after every load.

Measuring. -- Trash fish are usually purchased from the boat by either weight or volume. Menhaden plants pay on the basis of 1,000 fish. A few plants have elaborate continuous, or batch weighers, which print a weight ticket. Small plants purchase trash fish by the standard shrimp box, a current price being $1.00 per full shrimp box.

Basis of price. --Fish meal manufacturers cannot normally pay more than $20 per ton for trash fish. Since only 1 ton of fish meal can be produced from 4 tons of trash fish and the market price for good-quality fish meal ranges from $120 to $135 per ton, the author calculates that a plant cannot make a profit if it pays more than $80 for the raw material to produce a ton of finished product.

3.10

Practicable analytical methods. -- One of the most difficult problems related to the filing of petitions for food additives is the presentation of practicable analytical methods for the determination (1) of the amount of the additive or (2) of any substance formed in foods by reason of its use. Analytical methods are unquestionably needed for enforcement purposes if tolerance levels are established; however, the Amendment does not contemplate that tolerance limits are required in every case. Indications that tolerances are not always required are implicit in the first proposed white list, which included many substances for which no quantitative limitations are given. The fact is that the vast majority of additives are functionally self-limiting at levels well within the safe range. Such built-in limitations may arise by virtue of effects on the color, flavor, taste, or texture of foods or by virtue of the cost of excessive levels.

Principle of inconsequential levels. --Many competent toxicologists believe that the Amendment is unreasonable in its demand for regulatory control of any finite amount of a substance in food, however minute or indeterminate it may be according to the most refined analytical methods. Even the purest substances contain what chemists call traces of impurities. Ordinary table salt may contain a trace of arsenic, yet it has never been thought necessary to set limits on the arsenic content of a food by reason of the use of salt in its manufacture.

The hesitancy of competent experts to base judgments of safety on experience alone, particularly when such experience is epidemiologically or otherwise uncontrolled, must be accepted. For practical purposes it may be advisable to accord "old additives" the presumption of safety under normal conditions of use, until the evidence indicates otherwise.

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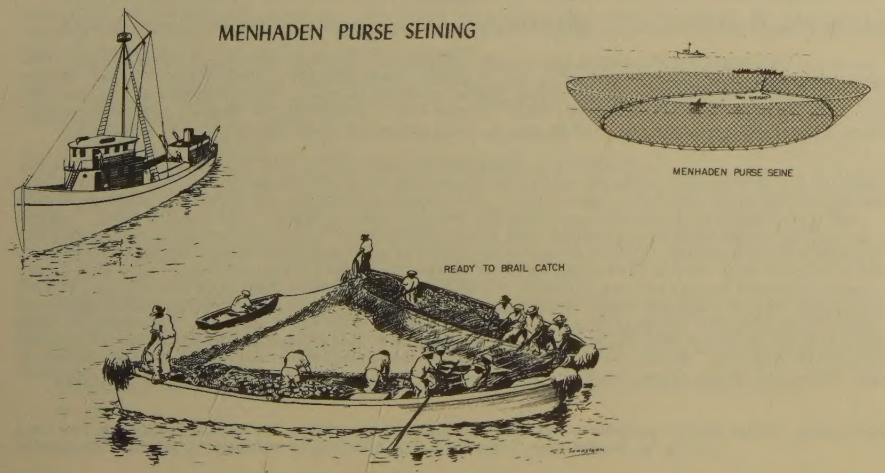
Washington 25, D. C.: Price 40 cents.



2.3 (Cross Reference: 8.7)

chlorination and filtration may be necessary.

Contamination with extraneous materials. -- Contamination of the product with extraneous materials is the result of improper handling and poor housekeeping.

If spoilage bacteria are not removed from the surfaces with which the raw product comes into contact they soon multiply and inoculate the product with large numbers of these organisms. The greater the bacterial load the shorter will be the shelf life of the fillet.

Almost every aspect of fish processing is intimately tied up with sanitation. The location of the plant should be selected to minimize the opportunities for contamination in the immediate environment. The problems of rodent and insect control and of obtaining good water should be considered.

All of the people who are in any way connected with food processing should be made aware of and instructed in the fundamentals of food sanitation and its implications.

An unsanitary product at the end of the packaging line is indicative of poor sanitary practices at one or more points along the product line.

2.1477 LINE FISHERY FOR MACKEREL

Nedelec, C.
Science et peche No. 63, 4 pp. (Oct. 1958) (In French)
World Fisheries Abstracts 10, 17-18 (May-June 1959)

Every year, from May to October, mackerel is line-fished off Boulogne, France, from boats built of wood, 12 to 15 m. (39.4 to 49.2 ft.) long and from 15 to 25 G.R.T. Most of them are small trawlers not powerful enough for trawling all the year round. The special deck equipment includes: bait holders (3), meat grinder to prepare the bait (strouille), chains fixed to the end of a warp close to the fore gallows for anchorage, and wooden boxes for the fish. The crew is composed of 8 to 10 men.

Fishing method.--The boats sail early in the morning to be at the fishing grounds before sunrise. When the shoal is located, the boat is anchored across the current and ahead of the shoal with regard to the current. The boat is kept across the current by means of a special back spring, the length of which is adjusted according to the current and wind direction. The bunch of chain used as an anchor allows the boat to drift-net. The bait used for chumming is a mixture of peanut press cake meal and ground mackerel and horse mackerel, diluted in sea water, and has more or less a liquid consistency. The chum with the "strouille" is dropped in front of the shoal. After a certain time, the mackerel start to get hooked. There are 2 different types of lines: (1) single line fitted with a single hook, baited with a white and bright piece of skin and flesh cut from the side of a mackerel, and (2) the "feathers" composed of 8 to 10 hooks with feathers fixed on the same line by means of short snoods. All the lines are made of nylon, they are hand-operated and weighted according to the depth of the shoal.

At the beginning of the season, the feathers seem to be the best lines, at the end of the season single lines are preferred. In October, the fish attracted by the strouille are sometimes caught with

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 ABSTRACTER: Jacques Chaux

3.20 THE AFDOUS CODE--A REVIEW OF RECOMMENDED SECTIONS

Anonymous
Frosted Food Field 29, 84-85 (October 1959)

During June 1959, the officials of AFDOUS met in Boston, Massachusetts, and approved the first three sections of the Frozen Food Handling Code. The outline of the code is a review of the requirements and is subject to approval by the individual states.

Retail Section

Section I. Definitions.--A. "Frozen Foods" shall mean articles used for food or drink for man or other animals (1) that have been processed, (2) that have been packaged and preserved by freezing in accordance with good commercial practice, and (3) that are destined for sale in the frozen state.

Section III. Handling practices.--A. Frozen foods shall not be accepted for delivery by a retail outlet when the internal product temperature exceeds 0° F. B. All frozen foods received at a retail outlet shall be immediately placed in back-room storage, or in display cases. C. Each retail outlet shall be equipped with back-room storage of sufficient cubic displacement to accommodate the storage of those frozen foods that are not placed directly in display cases at time of delivery. D. All frozen foods in back-room facilities, or in display cases, shall be held at an air temperature of 0° F., or lower, except for defrost cycles and intervals, or for other conditions beyond the immediate control of management of the retail outlet. Notwithstanding any such designated exceptions, the internal temperature of frozen foods, so involved, shall not exceed 0° F. E. In no instance shall frozen foods be placed above the designated product load lines with resulting obstruction of the normal flow of refrigerated air within any display case. F. No frozen food shall be offered for sale, the internal

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 ABSTRACTER: Kathryn L. Osterhaug

3.235 THE USE OF MONOSODIUM GLUTAMATE IN PRE-COOKED FROZEN MEALS

Brown, Mary B. and Bollman, Marion C. (Quartermaster Food and Container Institute for the Armed Forces, Chicago, Illinois)
Quick Frozen Foods 22, 231-233 (October 1959)

The usefulness of monosodium glutamate as a flavor improver in processed and frozen foods appears to be well established. Although much excellent work has been done on the subject, there remain areas where further work would be of value. For example, precooked frozen meals are known to be benefited by monosodium glutamate; however, more data are needed on (1) the specific components of the meal benefited by monosodium glutamate and (2) the most desirable concentration of MSG in these foods.

The purpose of this study was to obtain experimental data on each of these problems.

Effect on meal components.--In order to simulate actual conditions of use, the items to be tested were arranged in four menus as follows:

Menu 1:	Roast turkey with dressing, oven brown potatoes, green beans
Menu 2:	Chicken pot pie
Menu 3:	Beef patty, mashed potatoes, whole kernel corn
Menu 4:	Beef pot roast, au gratin potatoes, peas

The levels of monosodium glutamate used in each menu item were based on the results of preference studies by Giradot and Peryam (1954) and on the recommended commercial concentrations.

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 ABSTRACTER: Kathryn L. Osterhaug

3.2382 USE OF FLEXIBLE PACKAGING MATERIALS AND INERT GAS TO INCREASE THE SHELF-LIFE OF FOOD PRODUCTS

Gross, Gerald B. (Technical Services, Milprint, Inc., New York, N. Y.)
Food Technology 13, 621-623 (November 1959)

Introduction.--Until recently, many of the most popular food products could not be prepackaged by the processor because packaging materials that could insure an extended shelf-life of several weeks were not available.

The need for inert gas packaging.--Oxidative rancidity has been a trouble spot in the food industry for years, but today most food packers are eliminating the difficulty either with an evacuated or a gas package. Vacuum packaging is used, for example, in meat and cheese packaging to preclude oxidative spoilage. Many products that are now packaged in pouches made from light-weight foil laminations could be marketed without the innovation of gas packaging. Gas packaging, however, relieves the strain on the materials and enables them to resist fracture or puncture by sharp products within the package and from crushing by atmospheric pressure.

Food products that need protection.--Many independent studies have shown that if food products are packaged in nitrogen, their shelf-life is extended considerably. For example, peanuts packed in 20 percent oxygen were judged rancid after less than 6 weeks under atmospheric storage conditions; however, peanuts packed in nitrogen showed a considerably longer shelf-life. Powdered milk that is used extensively in institutional feeding and in coffee-vending machines is packaged in nitrogen that contains less than 2 percent of oxygen.

Recent studies have also indicated that fresh meats will retain their red color if packaged in

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 ABSTRACTER: Martin Heerdt

LINE FISHING FOR MACKEREL

FROZEN-FOOD HANDLING CODE

MSG FOR FROZEN FOODS

FLEXIBLE PACKAGING MATERIALS

3.20

temperature of which exceeds 0° F. G. All frozen foods in a retail outlet shall be held, stored, and displayed under good sanitary conditions so as to avoid any contamination of product. H. All retail outlets shall employ the first-in first-out basis of inventory control.

Transportation Section

Section III. Handling practices for over-the-road transportation. -- A. Vehicles shall be precooled to an air temperature of +20° F., or lower, before loading. B. Frozen foods shall be securely packaged, or wrapped, in a sanitary manner before they are offered for transportation. C. Any frozen food shipment shall not be offered for transportation when the internal product temperature exceeds 0° F. D. Frozen foods shall be loaded within a vehicle of transportation so as to provide for free circulation of refrigerated air at the front, rear, top, bottom, and both sides of the load, except for vehicles of envelope type construction wherein refrigerated air circulates within walls of said vehicles. E. The internal product temperature for any individual consignment of frozen foods shall not exceed 0° F. during any loading, transportation, or unloading of said consignment. F. The mechanical refrigerating unit of vehicles, shall be turned on and doors of vehicles shall be kept closed during any time interval when loading, or unloading, operations cease.

3.2382

nitrogen. Dry activated yeast; natural cheeses including Swiss, Muenster, Brick, Mozzarella, and other varieties; dried beef; orange and other citrus juice powders; assorted nut meats; dry soup mixes; powdered eggs; potato chips, dehydrated vegetables; and baby foods have all been packaged effectively with inert gas in flexible packages. From a practical standpoint, less than $\frac{1}{2}$ of 1 percent of oxygen in the package is satisfactory and in some cases 1 to 2 percent of oxygen is acceptable.

The proper flexible packaging materials. -- The ideal packaging material for flexible gas packaging would be of zero permeability to gas and readily machineable so that it easily could be converted into a hermetically sealed package. Most packagers try to achieve the barrier properties of .0015 inch of foil by utilizing combinations of low permeable films with other materials. This provides the necessary characteristics that enable them to identify their product by various printing methods, and to fabricate the laminations into suitable packages. The group of acceptable low permeable membranes include .00035 inch to .0007 inch foil, polymer-coated cellophane, polyvinylidene chloride, low plasticized rubber hydrochloride, and polyester-type films. Paper, polyethylene, polyvinyl chloride, and cellulose acetate are used in conjunction with these materials for purposes of merchandising, printing, and machineability. Individually, these materials are not acceptable as gas impermeable membranes.

The choice of basic materials and subsequent laminations in individual cases is influenced by other protection factors that may be required. These include such factors as moisture-vapor protection, possible chemical reaction between certain foods and the packaging material, merchandising concepts, machineability in the convertor and food processor plants, adaptability to packaging equipment, and cost. Various methods of combining or laminating the materials are used. These generally involve either a solvent adhesive or a hot melt in order to achieve a material that is relatively impermeable to gas and that will retain a substantial portion of the inert gas during the shelf-life of the product.

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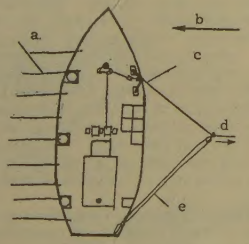
a scoop. The average catches are generally 600 to 800 kg. (1,323 to 1,763 lb.) of mackerel, sometimes 1,500 kg. (3,307 lb.) or over, in 12 hrs. The fish are kept in 30 kg. (66.1 lb.) boxes; due to the short duration of the trip, ice is not commonly used.



a. lines
b. current
c. direction of warp
d. sham anchor
e. ring-line

Feathered hook

3.235

Approximately 250 meals of each treatment were filled into individual three-compartmented aluminum trays and covered by crimping aluminum foil over the flange of the tray. The samples were placed in a freezer maintained at -10° F. within 30 minutes after filling.

The data collected indicate that during freezer storage of from 6 to 12 months the following items were benefited by the addition of monosodium glutamate in the amounts shown in the right-hand column as follows:

	Percent
Beef patty	0.45
Turkey with dressing	0.3
Mashed potatoes	0.15
Green beans	0.1
Chicken pot pie	0.2
Oven-browned potatoes	0.15

No preference was indicated for any level of monosodium glutamate over the control for peas, corn, au gratin potatoes, or beef pot roast.

3.19 EFFECT OF RADIATION PASTEURIZATION ON THE STORAGE LIFE AND ACCEPTABILITY OF SOME NORTH ATLANTIC FISH

Carver, Joseph H. and Steinberg, Maynard A. (U. S. Bureau of Commercial Fisheries, East Boston, Massachusetts)
Commercial Fisheries Review 21, 1-6 (October 1959)

Objectives.--The study reported here was designed to determine the effect of pasteurization by irradiation on the useful refrigerated storage life of several species of North Atlantic fish. The irradiated fish were held at 35° F.

The study was divided into two phases: (1) a screening study to determine the organoleptic acceptability of irradiated products after they had been held under refrigeration for only a few days, and (2) a study to determine the storage life at 35° F. of samples that had been subjected to different levels of irradiation.

Screening study.--Raw flounder fillets (Pseudopleuronectus americanus), raw and blanched fillets of cod (Gadus morhua), pollock (Pollachius virens), and whiting (Merluccius bilinearis), and raw and blanched dressed butterfish (Poronotus triacanthus) were used. All of the samples were vacuum packed in C-enamel tin cans, frozen to -20° F., and irradiated in the frozen state at levels ranging from 116,250 to 1,860,000 rads. The irradiated samples were held at 0° F. until they were submitted to the taste panel.

The radiation dosages that resulted in organoleptically acceptable products are shown in table 1 (see over). Irradiation bleached the meat of raw cod, pollock, and blackback even at the lowest dosages employed. Raw whiting became slightly pink at the lowest dosage, a condition that was more severe at higher dosages. The blanched meat of pollock, whiting, and butterfish became slightly gray after irradiation.

Storage study.--The fish used in the storage studies were irradiated at levels of 232,500 and 465,000 rads except for one lot of pollock that received 930,000 rads.

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 ABSTRACTER: Kathryn L. Osterhaug

3.4 FISH SMOKING

Empey, W. A. (Division of Food Preservation and Transport, Homebush, New South Wales)
Food Preservation Quarterly 19, 42-48 (September 1959)

The preservative effect of a combination of heavy salting, intense smoking, and drying, which produces products such as red herring, allows products so treated to be held in edible condition for several months without refrigeration. The present-day demand, however, is for lightly cured smoked fish that are attractive in flavor and appearance, but that require refrigeration if they are to be held longer than a day or two. In the past, smoke curing was a rather haphazard procedure, but present techniques allow some measure of control.

Preparation for smoking.--Only high-quality fresh fish should be smoked. Prompt icing or chilling in refrigerated sea water is recommended if fish are to be held more than a few hours before processing. These methods hold fish in a satisfactory condition for a period of not more than 5 or 6 days for nonoily fish and for about 2 or 3 days for oily fish. For longer periods of holding, temperatures of 0° F. or lower are necessary in order to preserve quality. Fish should not be salted before freezing as this promotes the development of rancidity during storage.

Although some smoked products are made from whole fish, most fish for smoking are gutted and cleaned before being smoked. All visible blood and tissue should be removed as they decompose rapidly.

Fish are often colored with artificial coloring materials before being smoked. This is particularly true when a light smoke cure is used. If the fish are colored before they are salted they usually are dipped for from ½ to 1 minute in the aqueous dye solution. This is supposed to result in a more uniform color than is achieved when dye is added to the brine during salting.

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 ABSTRACTER: Kathryn L. Osterhaug

3.2496 TIME-TEMPERATURE TOLERANCE OF FROZEN FOODS. XIX. READY-TO-COOK CUT-UP CHICKEN

Klose, A. A.; Pool, M. F.; Campbell, A. A.; and Hanson, H. L. (Western Regional Research Laboratory, Albany, California)
Food Technology 13, 477-484 (September 1959)

Experimental.--Frozen-storage tests were carried out on two commercial packs of cut-up chicken fryers differing in type and adequacy of package, one experimental pack of cut-up fryers in tin cans, and one commercial pack of cut-up stewing chickens. Evaluations were made of moisture loss, peroxide development, off odors in raw meat, and off flavors in cooked product.

Results.--Slight off odor in thawed raw meat was the first quality defect to be detectable, followed by off flavors in cooked products. Chickens from all packaging conditions retained their high-quality at least 6 months at 0° F. However, there were large differences in stability between the two commercial packs of fryers, which were to a great extent reflections of the large difference in package permeability. Chickens in the more permeable package had less than one-third of the storage life of chickens in the less permeable package. Stewing hens held in a package of permeability intermediate between that of the two fryer packages had a corresponding intermediate storage life. Peroxide development in the fat of stewing hens was correlated with the level of organoleptic deterioration.

A storage test of cut-up fryers packed in tin cans with controlled atmospheres was used to establish the deteriorative effects of oxygen and loss of moisture. Loss of moisture in itself was found to have little effect on organoleptic deterioration or chemical changes involving oxygen consumption. Access to oxygen of the air, on the other hand, contributed as much to the rate of deterioration as did a substantial rise in temperature. Appreciable deterioration and carbon dioxide production in nitrogen

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 Authors' summary

4.5 BUTTERFAT OXIDATION--EVALUATION OF LEA'S ALDEHYDE DETERMINATION METHOD

Tamsma, Arjen and Powell, Robert D. (Dairy Industry Section, Iowa Agricultural Experiment Station, Ames)
Journal of Agricultural and Food Chemistry 7, 643-645 (September 1959)

Lea's (1934) method for the determination of aldehyde involves an iodometric titration of the bisulfite that is bound by the carbonyl group. Because the saturated aldehydes of medium molecular weight were at one time considered to be mainly responsible for the objectionable flavors and odors of oxidized fat, Lea proposed the iodometric method for estimating fat oxidation. Tamsma (1955) and others since have shown that a wide variety of saturated and unsaturated carbonyl compounds, including both aldehydes and ketone, are formed during fat oxidation. These compounds may behave differently than heptanal. Recovery by Lea's bisulfite procedure therefore is not necessarily complete.

The present study was undertaken to investigate, by Lea's method, the extent and nature of aldehydes recovered from milk fat as compared with saturated normal aldehydes composed of 7 to 10 carbon atoms.

Since the completion of this study, researchers have shown by chromatographic methods that carbonylic oxidation products from butterfat appear to be largely ketonic rather than aldehydic. For this reason, butterfat is hardly a fair choice of substrate on which to "evaluate" the Lea method because ketones react more slowly and incompletely with bisulfite than do aldehydes.

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 ABSTRACTER: Richard W. Nelson

RADIATION PASTEURIZATION

STORAGE OF FROZEN CHICKEN

SMOKING FISH

ASSAY FOR ALDEHYDES IN FAT

3.2496

packs indicated that anaerobic reactions also are involved.

Tests at +20°, +10°, 0°, -10°, and -30° F. provided evidence to support a recommendation for storage at 0° F. or below. Storage life at +20° F. ranged from less than 1 month to 6 months for the various packaging conditions, at +10° F. from 3 to 10 months, whereas at 0° F., storage life was at least 6 months in the poorest package and about 2 years in the best package. Within reasonable storage periods, a series of temperature fluctuations had a slightly greater deteriorative effect on quality than a steady temperature equal to the arithmetic mean of all of the fluctuations.

Conclusions.--The results emphasize that statements on storage life, to have real value, must accurately define the intimate product environment as governed by packaging as well as by temperature conditions.

4.5

Experimental procedure.--Commercial preparations of various aldehydes were purified by distillation under reduced pressure to constant boiling point, density, and refractive index.

Milk fat was oxidized at 100° C. Solutions were obtained by dissolving either the oxidized fat or the "volatile fraction" in Skellysolve B.

Recovery of the synthetic aldehydes was studied by dissolving weighed quantities in known volumes of benzene or Skellysolve B. The aldehyde liberated from the aldehyde-bisulfite complex was examined. Quantitatively complete isolation of aldehyde was not attempted, but the procedure was carefully standardized in order to compare the amounts isolated with synthetic aldehydes and with aldehyde from milk fat. Ultraviolet absorption characteristics provided information about the mixture of the isolated aldehydes.

Lea's method was modified by shaking in a nitrogen atmosphere and by using Skellysolve B. instead of benzene as a solvent.

Results.--Lea's method of determination of aldehyde in fats is excellent for n-heptanal. For normal aldehydes with more than seven carbon atoms, researchers found that recovery decreased with increasing chain length and that limiting values were reached with the C_9 and C_{10} aldehydes. For oxidation products from milk fat, the value found by Lea's method is arbitrary because these carbonylic compounds do not behave like heptanal. Incomplete recovery can be caused by low solubility in water and low reactivity with bisulfite. Too high recovery may be obtained with unsaturated carbonyl compounds as a result of reaction of the double bonds. The oxidation product from milk fat was of ketonic character; the yield of aldehyde was about one-third to one-tenth that obtained from synthetic aldehydes.

3.19

The samples were prepared and handled in the same way as those in the screening study. After the irradiated samples had been returned to the laboratory they were thawed and held at 35° F. The samples to be evaluated were cooked either by steaming or by frying in deep fat. Unidentified, unirradiated controls were evaluated with the irradiated samples.

The following conclusions were reached as the result of the storage studies:

1. At a storage temperature of 35° F. the shelf life of raw butterfish can be extended about three times by treating at a level of 232,500 rads. Irradiating at a dosage level of 465,000 rads or blanching before irradiation resulted in slightly decreased acceptability with no increase in storage life.
2. Raw cod fillets irradiated at levels of 232,500 or 465,000 rads and stored at 35° F. were less acceptable than were the unirradiated, frozen controls and had a shelf life of approximately 30 days.
3. Blanched cod fillets irradiated at either 232,500 or 465,000 rads and stored at 35° F. were less acceptable than the unirradiated, frozen controls and had a maximum storage life of approximately 30 days.
4. Irradiated raw pollock fillets stored at 35° F. and cooked by being steamed exhibited no useful increase in shelf life over that of unirradiated unfrozen fillets.

Table 1 - Irradiation Doses Resulting in Acceptable Cod, Pollock, Blackback, and Whiting Fillets, and Dressed Butterfish

Species	Maximum Dose Resulting in Acceptable Products		Dose Resulting in Products of Greatest Acceptability	
	Raw Fish	Blanched Fish	Raw Fish	Blanched Fish
	(Rads)			
Cod	465,000	232,500	116,250	232,500
Pollock	232,500	930,000	232,500	232,500
Blackback	930,000	-	465,000	
Whiting	116,250	232,500	116,250	116,250
Butterfish	697,500	930,000	232,500	232,500

Note: The irradiated fish were cooked in steam for taste-panel evaluation.

3.4

Salting the fish before smoking firms the flesh, which is essential for the development of surface gloss or pellicle during subsequent drying. The salt also contributes to the flavor of the final product. In mild smoke-cured fish products, the salting is controlled to result in the uptake of salt by the fish in the amount of 2 to 2½ percent of its weight. In strong smoke-cured fish products such as red herring, the fish are allowed to absorb salt to the extent of 10 to 12 percent of the weight of the fish. The salt will exert pronounced preservative effect against mold and bacteria at a level of 8 to 10 percent in the fish.

When the fish for smoking has previously been preserved by salting, some of the salt must be removed before smoking to produce mild smoke-cured products. This is accomplished by soaking the fish in tanks of cold running water for from 6 to 48 hours, depending on the thickness of the fish and the degree of salting. Because of the processing difficulties involved, it is not common commercial practice to use heavily salted fish to produce mild cured products.

To obtain the best results in smoking, the prior formation of a surface pellicle is important. The pellicle is formed by the partial dissolving of fish muscle proteins in the salt solution followed by concentration and drying at the surface of the fish. A well-formed pellicle promotes an even uptake of smoke, helps retard the drying of the deeper layers of the fish, and reduces the tendency of the fish to crack during exposure to the elevated temperatures experienced in hot smoking.

Smoking.--The most common commercial method of smoke curing is by the use of cold smoke in which the temperature both of air and the smoke is kept at 85° F. or below for most of the smoking period. In hot-smoking, the fish are simultaneously smoked and cooked at temperatures ranging from 130° to 200° F. In the simplest types of equipment, smoke and heat are supplied by burning wood underneath the fish, which are exposed to the smoke by being placed in the natural updraft from the fire. During recent years, various smoke kilns have been developed in an attempt to obtain better control of the smoking process. These include the Torry Research Station kiln, various tunnel-type smokehouses, and electrostatic smoking equipment.

3.8 EXPERIMENTS ON PICKLING FISH WITH VINEGAR AND MALABAR TAMARIND

Vasavan, A. G. and Varma, K. G. (Fisheries Technological Station, Kezhikeda, India)
Current Science 28, 153-154 (April 1959) (Reprinted)

It has been suggested by Venkataraman and Sreenivasan that "Malabar Tamarind" (from Garcina cambogia) help in the fermentation of fish in the "Colombo Curing" method owing to citric acid, tartaric acid and some polyphenols lowering the pH of the pickling medium and thereby inhibiting the growths of spoilage organisms. The use of vinegar for this purpose has now been explored.

Fresh oil sardines, gutted and well washed, were packed in two sets of porcelain jars with one-third the weight of salt. To one set, 5 percent by weight of tamarind and to the other 5 percent by weight of vinegar containing 5 percent of acid (expressed as acetic acid) were added. Within 2 days, self-brine covered the fish to the top. The rate of spoilage in the two sets has been adjudged by taking samples periodically and estimating pH, total volatile bases, trimethylamine, total count, halo-tolerant count and red halophilic count. Anaerobes (plated on thioglycollate agar using spray dish technique) and acid tolerant organisms (Thermoacidurans agar) were enumerated after 6 months to ascertain the extent of residual microflora. In the first set, this rate seems higher, (from total volatile base and trimethylamine values) and halotolerant count, but not total count, goes up after 2 months, although final trimethylamine value in both sets are the same and well below spoilage level. The pH rises from 6.0 to a steady value 6.4 in a month while that of vinegar-brine changes from 5.2 to 6.0 falling to a steady value 5.4 after another month, the titratable acidity being 1.6 times higher than in the first set. The aerobic flora consisted of sporeformers, besides a few slender rods and a coccus. The anaerobes were long filamentous, non-spore forming rods and a short spore-forming rod. These did not digest or blacken liver infusion broths but formed gas even at pH 6.0. It is likely that they aid in keeping down the growth of spoilage organisms as suggested by Venkataraman and Sreenivasan.

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4.62 EFFECT OF ANTIOXIDANTS ON VITAMIN E DEFICIENCY IN CHICKS

Anonymous
Nutrition Review 17, 340-342 (November 1959)

Introduction.--The symptoms of vitamin E deficiency in chicks include muscular degeneration, exudative diathesis, and encephalomalacia. Classically, these symptoms have been produced by placing the chicks on a diet as low in vitamin E as is possible and feeding them some highly unsaturated fat such as fish oil. As an aid to vitamin E depletion in chicks, the hens may be maintained on a diet deficient in vitamin E. The prevention and cure of a vitamin E deficiency is accomplished by including in the diet small amounts of tocopherol or larger amounts of certain antioxidants such as methylene blue; normal N^1-diphenyl-paraphenylenediamine (DPPD); 2, 6-ditertiarybutyl-4-methoxy-phenol (BHA); or 2, 6-ditertiarybutyl-4-methylphenol (BHT). A question that has been raised as to the specificity of tocopherols such as vitamin E is, can the synthetic antioxidants replace tocopherol in its metabolic functions or do they simply protect it from oxidative destruction?

Experimental.--To answer this question, L. J. Machlin, R. S. Gordon, and K. H. Meisky (J. Nutrition 67, 333 (1959)) fed three, purified, vitamin E-deficient diets to week-old chicks for 3 weeks. Diet 1, or the low casein, low fat diet contained 15 percent casein, 10 percent gelatin, and 4 percent lard. Diet 2, or the high casein, high fat diet contained 20 percent casein, 15 percent gelatin, and 16 percent lard. Diet 3, or the assay protein (a soybean protein) diet contained 35 percent assay protein and 16 percent lard. The low casein diet contained approximately 0.09 I.U. of vitamin E per pound, whereas the other two diets contained about four times this amount.

Results.--Chicks on the low casein, low fat diet exhibited muscular degeneration and a high mortality, which evidently was caused by the destruction of vitamin A as this compound dropped to very

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ABSTRACTER: Martin Heerdt

4.91 DIETARY MODIFICATION OF SERUM CHOLESTEROL IN THE CHICK

March, B. E.; Biely, Jacob; Tothill, J. and Haqq, S. A. (The University of British Columbia, Vancouver, B. C.)
Journal of Nutrition 69, 105-110 (October 1959)

Introduction.--In the growing chick, low protein diets result in an elevated level of plasma cholesterol (Nishida, Takenaka, and Kummerow 1958; and Johnson, Leveille, and Fisher 1958). Dietary fat may either increase or decrease blood cholesterol depending upon the level of fat fed, the degree of saturation of the fat, its fatty acid composition, and the cholesterol content of the diet according to Felch et al. (1958). An increase in the level of dietary protein increases fat digestibility in dogs and rats (Magee, Kim, and Ivy 1953), and in chicks (Biely and March 1957).

March and Biely (1957) observed that high levels of dietary fat reduced thyroid size in chicks. Ershoff (1949) reviewed the work of several investigators who found that high-fat diets lowered the metabolic rate and he reported additional experiments in support of a beneficial effect of fat in the diets of hyperthyroid animals. A relationship between thyroid activity and the level of circulating cholesterol was recognized by Oliver and Boyd (1958).

Purpose.--This study with serum cholesterols was designed to compare the effect of different fats when fed in basal diets containing 20 and 26 percent of protein. The thyroid gland of each of the chicks was weighed to learn if the diet, thyroid activity, and serum cholesterol level were interrelated.

Experimental.--Basal diets were formulated to contain 20 and 26 percent of protein, respectively. Fat was used in place of cornstarch in the basal diet if it had been supplemented with 8 percent

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ABSTRACTER: Martin Heerdt

6.130 PEANUTS, GRASS YIELD EDIBLE PROTEIN

Anonymous
Chemical and Engineering News 37, 42-43 (October 19, 1959)

Introduction.--Malnutrition, the world's most serious health problem, has kept research workers busy for over two decades. The problem is how to get at valuable protein stored up in abundant vegetable materials. Ingenious theories, ideas, and processes have failed because almost all protein extracts are unattractive in color, taste, and odor. An $84,000 factory, now operating in London, England, appears to have overcome this difficulty. The process used in this factory will extract protein from almost any vegetable matter by the impulse process, which was invented and patented by Israel H. Chayen.

Chayen process for peanuts.--Mr. Chayen originally developed his impulse process for the continuous cold degreasing of bones. Further work by Mr. Chayen since 1953, has resulted in an adaptation of the Chayen process to vegetable-protein extraction. A pilot plant established 15 months ago is now processing peanuts and grass by this process.

The extraction process for peanuts is as follows: Peanuts and alkaline water at pH 8.5 are fed into an impulse renderer. Here, beater arms set up shock waves that open the plant cells and release protein within $\frac{2}{3}$ second. Under alkaline conditions, the shock waves cause a reaction between protein and vegetable oil that forms a protein-oil solution. The protein-oil solution and undissolved matter then pass through a vibrating screen that removes the fiber. The remaining solution is centrifuged to recover separately free oil, carbohydrate, and protein-oil solution. The protein-oil solution is then neutralized in tanks with dilute sulfuric acid of pH 4.5 to 4.8, and a protein-oil sludge is precipitated. This sludge is passed through a basket centrifuge and is recovered as a paste containing

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ABSTRACTER: Martin Heerdt

PICKLED SARDINES

ANTIOXIDANTS AND VITAMIN E

HERRING OIL VS. SERUM CHOLESTEROL

EXTRACTION OF EDIBLE PROTEIN

4.62

low levels in these birds. Three antioxidants: BHT; 1,2-dihydro-6-ethoxy-2,2,4-trimethylquinoline; and calcium DL-2-hydroxy-4-methyl thiobutyrate were used at 0.1, 0.01, and 0.6 percent, respectively, to (1) prevent death from the destruction of vitamin A and (2) to alleviate muscular degeneration to some extent. Encephalomalacia or muscular degeneration and exudative diathesis resulted when the diets contained 16 percent lard.

The thiobutyrate derivative at 0.6 percent did not prevent encephalomalacia in chicks on the high casein diet supplemented with 0.6 percent arginine, but the quinoline derivative at 0.02 percent did prevent this disease but not muscular degeneration. In contrast, 0.004 percent DL alpha-tocopherol prevented both symptoms and also prevented the accumulation of liver peroxides. The two synthetic antioxidants did not prevent the accumulation of liver peroxides. In in vitro experiments, the quinoline antioxidant was more than eight times as effective as tocopherol in preventing peroxide formation in liver homogenates of chicks on the assay protein diet. This antioxidant was also very effective in preventing oxidative rancidity.

Discussion.--Since the low casein diet contained so little vitamin E (0.09 I.U. per pound), the effective antioxidants must act merely by protecting vitamin E. Dam and his coworkers found that if vitamin A was completely removed from the diet of rats, methylene blue no longer prevented certain deficiency symptoms. Peroxide formation in the livers of deficient birds appeared to be correlated with muscular degeneration, but no such correlation could be found in the case of encephalomalacia. Muscular degeneration appeared to be the sole symptom on the low casein, 4 percent lard diet, whereas encephalomalacia resulted as the major symptom on the high casein, 16 percent lard diets. A solution to the problem may come from a study of the relationship between tocopherol, coenzyme Q, and the terminal oxidation enzymes.

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The vinegar-treated sardines were silvery white, their flesh being flaky, soft and of fruity flavor unlike the tamarind-treated ones, which were brown and hard and covered in rancid brine. When fried they were like fresh fish save for the slight taste of the added agents. Vinegar-treated sardines are better as judged from taste, appearance, and also by total volatile base and trimethylamine values and thus the use of vinegar for pickling can be recommended.

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about two parts protein, one part oil, and seven parts water. Conventional solvent extraction with toluene and acetone finally is used to separate oil from protein in a critical operation that controls the texture, color, and taste of the protein extract. The byproducts of peanut-protein extraction are a high-quality peanut oil and peanut carbohydrate. The latter is valuable as an animal feed.

Grass processing.--The protein-oil solution from grass is prepared and separated in the same way as the solution from peanuts. The fiber is screened out; and the protein-oil solution is neutralized and solvent extracted. The byproduct of grass-protein extraction is a chlorophyll syrup that contains carotene, chlorophyll, xanthophyll, steroids, sterols, riboflavin, and B-complex vitamins. The process economics of grass-protein extraction will be improved by exploiting this syrup.

Operational details.--Capital costs for the impulse extraction process are estimated at about $3 per person in the population being served with peanut protein. This would provide 1 pound of vegetable protein per person per week at a cost of few cents per pound. The existing pilot plant is able to process 1 ton of either grass or peanut protein per hour. For economic operation, a commercial plant should be designed to produce about 4 tons of vegetable protein per hour. Power consumption is about 100 kw. per ton of material processed.

Peanuts contain 25 percent crude protein, 44 percent oil, 18 percent starch, about 6 percent moisture, and 8 to 9 percent soluble sugars. One-hundred tons of fresh grass having 85 percent water and an initial nitrogen content of 3.5 percent on a dry basis will yield 2¼ tons of pure protein, 7 tons of fiber, and 0.6 tons of chlorophyll syrup. The grass or plant material must contain a minimum of 1½ percent protein for extraction by this process. Sugar beet tops also contain this amount of protein.

Uses.--Vegetable protein can be added to cereals, soups, curries, meat pastes, and sausages. Peanut protein is almost white and tasteless; but grass protein is green and slightly bitter. The latter would be palatable only in strong-flavored foods.

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of the various fats. The Hanus iodine values of the fats used were: Crisco 74, lard 62, chicken fat 78, unsalted butter 32, corn oil 127, and light-pressed herring oil 137. Each diet was fed ad libitum to 22 Single-Comb White Leghorn male chicks kept under the customary conditions of management. Chicks were weighed individually at weekly intervals. Serum cholesterol was determined by the method of Zlatkis, Zak, and Boyle (1953) when the chicks were 3 to 5 weeks' old.

After 5 weeks, 10 chicks taken at random from each lot were transferred and placed on diets that were similar except for an added 1 percent of cholesterol. After 48 hours, blood was taken from chicks in each of the lots for the determination of serum cholesterol. Ten of the chicks that had received only the original diets throughout the 5 weeks and 48 hours were killed and body weight and thyroid gland weight was determined separately for each bird.

Results.--Chicks that received 26 percent protein showed lower serum cholesterol levels than did chicks that received 20 percent protein regardless of the fat in their diets. Chicks that received Crisco, butter, lard, or chicken fat as a supplement to either basal diet showed an increase in the level of blood serum cholesterol. Herring oil as a dietary supplement with either basal diet did not increase the level of blood serum cholesterol. Corn oil as a dietary supplement increased the level of blood serum cholesterol to a significant degree only in the chicks that received the 20 percent protein basal diet.

Chicks that received 1 percent cholesterol in their diets for 48 hours showed a markedly increased level of blood serum cholesterol. The amount was larger in the serum from chicks that received supplementary fat than it was in the serum from chicks that did not receive supplementary fat. With butter or lard as supplements, the serum cholesterol level of chicks on the 20 percent protein diet increased less than did the serum cholesterol level of chicks on the 26 percent protein diet. A negative correlation was found between thryoid size and serum cholesterol level. In relation to body weight, the thyroid gland was lighter in chicks that received 20 percent protein than in chicks that received 26 percent protein. The effect of the diet upon the serum cholesterol level may be mediated to some extent through the thyroid gland.

4.0 AN HISTORICAL SURVEY OF FATS AND OILS RESEARCH IN CANADA

Lemon, H. W. (Ontario Research Foundation, Toronto, Canada)
Journal of the American Oil Chemists' Society 36, 420-424 (September 1959)

Organized fats and oils research in Canada began at the Fisheries Experimental Station at Prince Rupert, B. C., in the late 1920's under the guidance of H. N. Brocklesby, now a consulting chemist in the United States.

In 1926, Dr. Brocklesby joined the staff of the Pacific Fisheries Experimental Station at Prince Rupert, B. C., one of the stations of what was then the Biological Board of Canada but later the Fisheries Research Board. An extensive study of fish oils was begun which included (a) the physical and chemical characteristics of pilchard, salmon, herring, and dogfish oils; (b) the possibility of using fish oils in paints and in foods; and (c) their medicinal properties, particularly their vitamin content. Associated with Dr. Brocklesby were O. F. Denstedt, now professor of biochemistry, McGill University, B. S. Bailey, now deceased, F. Charnley, and later L. A. Swain, now on the staff of the University of Toronto.

Much of the early work was done with pilchard oil. It was the most important of the fish oils in Canada at that time, but in recent years these fish have not been found in commercial quantities.

Dr. Swain specialized in the chemistry of the unsaponifiables in marine oils. He developed a chromatographic method for comparing the unsaponifiable fractions of oils by successive elutions of alumina columns with light petroleum, methylene chloride, ethyl ether, and methanol. The first fraction consisted of hydrocarbons, such as squalene. The second contained cholesterol, fatty alcohols, vitamins A and D, and some pigments. The third contained such glyceryl ethers as chimyl and selachyl alcohols. The fourth fraction, which was small in quantity, was not identified.

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6.34 RETARDS BOIL-OFF OF JUICES DURING PIE BAKING

Anonymous
Food Processing 20, 69, 71 (November 1959)

Algin is a natural gum that is extracted from the giant kelp that grows in the coastal waters of Southern California. In a bakery in Brooklyn, New York, algin is used to retard the boil-off of juices during the baking of fresh apple pies.

Algin, which is readily soluble in water, is supplied in powdered form. One part of algin absorbs 100 parts of water to form a soft gel that is both odorless and tasteless. A low concentration of algin, about 0.25 percent of the total pie filling, absorbs the juices that are released from apples during baking at high temperatures.

Algin has been found to be particularly effective in reducing the amount of boil-off from sliced green apples that are high in moisture and acidity.

Because algin prevents the loss of juice during baking, the pies do not lose weight. Algin also prevents the sugar juices from spilling between the pie crust and the sides or bottom of the pie pan. The pies therefore do not stick to the pans, do not scorch, and are easy to remove from the pans for serving.

For ease of application, the algin powder is blended dry with the sugar and cinnamon. Two-and-one-half pounds of powdered algin is blended with 100 pounds of sugar to produce a blend that is sufficient for use in 400 10-inch pies.

Fresh sliced apples are placed on the bottom of pie shells in pans on a conveyor line. One cup

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ABSTRACTER: Kathryn L. Osterhaug

6.15 NEW FISH SOLUBLES PLANT ADDED TO CANNERY OPERATION

Anonymous
Feedstuffs 31, 46 (October 17, 1959)

Introduction.--Construction of a new fish solubles plant that is reported to be the largest in the United States was completed recently on Terminal Island in California as a logical step toward the complete utilization of all available fish materials. The fish solubles production unit is available to all Terminal Island tuna and sardine canneries.

Factors.--An important factor in preserving the high nutritive values in fish solubles is the immediate acidification of the fish materials to a pH of 4.5 upon their arrival from the cannery. This finding was incorporated into the engineering of the new plant. Another factor that is important in the preservation of the original nutritive values of fish is the processing of fish viscera as rapidly as possible. The completely integrated operation of the new plant moves the viscera, including the fish livers, from the butchering lines in the cannery to the solubles plant in the shortest possible time.

Process.--Upon arrival at the solubles plant, the viscera are ground immediately and pumped into tanks, where natural enzymes are permitted to digest and liquefy them. The liquefied mass of viscera is then pumped through a fine screen and into tanks where it is blended with fish water that contains amino acids and vitamins. Lumps, bones, fish hooks, or other nonfluid material are removed in the screening process. Before this liquid is moved to the evaporators, a final screening is provided.

A combination of low temperature, high vacuum, and rapid flow is emphasized in the condensing process. Low temperature and high vacuum avoid the destruction of vitamins and of proteins. Rapid flow prevents baking of the material onto the equipment, which might cause shut-downs and interruptions in the process of continuous concentration.

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ABSTRACTER: Martin Heerdt

8.0 COMPOSITION OF CERTAIN SPECIES OF FRESH-WATER FISH
II. COMPARATIVE DATA FOR 21 SPECIES OF LAKE AND RIVER FISH

Thurston, Claude E.; Stansby, Maurice E.; Karrick, Neva L.; Miyauchi, David T.; and Clegg, William C. (Fishery Technological Laboratory, Seattle 2, Washington)
Food Research 24, 493-502 (September-October 1959)

Introduction.--In the present paper, primary attention is focussed on the ranges and averages of the nutritional components of fresh-water fish classified according to species. Other factors will be considered in a later report.

Experimental.--From the point of collection, fish were packed in ice as they were caught and shipped within 24 hours, by rail. Time in transit ranged from 2 to 4 days, and the fish, upon arrival at the Seattle laboratory, were of uniformly good quality. After being received, they were packed in plastic bags, frozen, and stored at -18° C. In the preparation of samples for analysis, the fish were thawed in lukewarm water, washed, measured, and weighed. Fillets were removed from both sides of the fish and were skinned. Skinned fillets were weighed and then were ground in a food chopper. The ground flesh was packed in ½-pound cans, vacuum-sealed, frozen, and stored at -18° C. until the analyses were made. Procedures described in Methods of Analysis of the Association of Official Agricultural Chemists (1955) were used and samples were analyzed in duplicate for moisture, oil, protein, and ash. Samples of fish received since 1956 were analyzed also for sodium and potassium by the use of a direct-reading flame photometer by a method adapted from one developed by the research laboratory of the National Canners Association.

Results and discussion.--Yields of skinned fillets ranged from 24.5 to 39.3 percent. Usually a higher percentage of fillet was obtained from the smaller fish.

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ABSTRACTER: Martin Heerdt

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Storage.--After evaporation, the fortified and condensed solubles is tested for fluidity, color, odor, total solids, pH, protein, and salt. When a storage tank full of the solubles meets the specified standards of quality it is pumped into 160,000-gallon shipping tanks. Records are kept of each batch that is produced and shipped.

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Except for a few deviations, variation in moisture content was small. Most of the fillets contained 75 to 82 percent moisture, with an average of 78 percent. Whitefish, shad, and chub were relatively low in moisture, whereas crappie, bullhead, and lake herring were relatively high. High moisture values often were found for the small species, and low values for the larger ones. Within a given species, variations of as much as 15 percent were noted. One species, siscowet trout, however, showed a range of 30 to 75 percent moisture within the 15 specimens analyzed. The lowest and highest values, respectively, were 29.8 percent in lake trout, a large species, and 84.1 percent in lake herring, a very small species.

The amount of oil in most of the fillets was less than 5 percent. Six species averaged more than 5 percent, and three species averaged more than 10 percent. In general, the oil content varied inversely with the moisture content. Most of the species reported in this paper contained between 80 and 83 percent of liquid or oil plus moisture. The greatest divergence from these values was found in the siscowet trout, in which the total amount of liquid varied from 79 to 93 percent, which left, in one specimen, not more than 6 percent of protein.

The protein content of the fresh-water fish usually ranged from 16 to 19 percent and averaged about 17 percent. All except four of the species were within this range. The ash content of most fresh-water fish ranged from 0.9 to 1.3 percent and averaged about 1.1 percent. A low value of 0.53 percent was found in a series of siscowet trout. Maximum individual variations ranged from 0.41 in lake trout to 1.48 in yellow perch. Composite samples were prepared from the nonedible parts of all of the fish in most of the series. The range of composition of each of these samples was moisture 58.0 to 78.9 percent, oil 5.2 to 27.6 percent, protein 12.3 to 17.8 percent, and ash 1.7 to 9.3 percent.

Summary.--Twenty-one species of fresh-water fish were analyzed for their proximate composition, and eight of these species were analyzed also for their content of sodium and potassium. In general, the composition of these fish was uniform. The exceptions show that a wide variation in composition exists both among the different species of fish and among the individual fish within a single species. The data also show that a variety of normal and special-purpose diets may be based on fresh-water fish.

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Recently, the work of the Fisheries Research Board has shifted to more fundamental studies. It is now concentrated at the Technological Station at Halifax, Nova Scotia, under the direction of F. A. Vandenheuvel. Their studies include the chemistry of marine oils, the kinetics of hydrogenation and of alkali isomerization, and the synthesis of unsaturated fatty acids. One of the projects at the Halifax station is the segregation of herring oil, which contains too high a proportion of saturated constituents to be a good drying oil and too high a proportion of highly unsaturated C_{20} and C_{22} acids to be an ideal starting-material for shortening and margarine. Vandenheuvel and Jangaard applied countercurrent solvent segregation to the methyl esters, using nitromethane. Esters with an iodine value of 126 were separated into extract and raffinate phases with iodine values of 220 and 80.

In 1953, the Fisheries Research Board initiated a study of marine sterols at the Pacific Experimental Station. Idler and Fagerlund isolated a new sterol, 24-methylene cholesterol from several species of shellfish and later synthesized it. They isolated another new sterol, 24-dehydrocholesterol, from the barnacle Balanus glandula and also synthesized it.

Much of the work of the Fisheries Research Board is contained in Bulletins 37, 59, and 89, published in 1933, 1941, and 1951. The last edition, "Marine Oils with Particular Reference to Those of Canada," is a volume of 400 pages and a standard reference book. Much credit is due to the Board and to Brocklesby, Denstedt, Bailey, Carter, and Swain for these publications.

Other topics include: the Ontario Research Foundation; Macdonald College, McGill University; the National Research Council Laboratories; the Food and Drug Laboratories, Department of National Health and Welfare; The Department of Agriculture; the Universities; and the Canadian Committee on Fats and Oils.

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of the algin-sugar blend is sprinkled over the apples in each pan and a top crust is added. The pies are then transported directly to the oven.

8.42 SODIUM AND POTASSIUM IN SALT-WATER FISH

Oglesby, Lennie M. and Bannister, Agnes C. (Department of Dietetics, Veterans Administration Hospital, Houston, Texas)
Journal of the American Dietetic Association 35, 1163-1164 (November 1959)

Thurston (1958) found that salt-water fish are acceptable for use in diets that must be moderately restricted in sodium content. Although all of the salt-water species that he analyzed were in a sodium range that permitted their use in these diets, the sodium contents varied markedly within this range. Since no data were available for fish from the Gulf Coast area, analysis of these fish for sodium and potassium appeared to be justified.

Method of study.--Nine species of fish common to the Gulf Coast were analyzed for sodium and potassium using the analytical procedure of the Metabolic Laboratories, Veternas Administration Hospital, which is a procedure similar to the flame-photometer method used by Thurston.

Results and discussion.--The sodium content of nine species of Gulf Coast salt-water fish is given in Table 1 (see over). The values ranged from 46.8 to 101.2 milligrams per 100 grams fish. Only one species--sheepshead--has a sodium content greater than 100 milligrams per 100 grams fish. The average value for the group was 66.1 milligrams per 100-gram portion.

Although the ratio of sodium to potassium varied considerably, the average was one part by weight of sodium to four parts by weight of potassium.

The sodium content of the fish analyzed is similar to that of salt-water fish from other geographic regions and is in a range that will permit their use in sodium-restricted diets.

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 ABSTRACTER: Kathryn L. Osterhaug

8.7 USE OF GRADE STANDARDS IN THE QUALITY CONTROL OF FISHERY PRODUCTS

Ambrose, Mary E. and Bender, Maurice
Food Technology 13, 249-251 (May 1959)

To aid the industry in this objective, the Bureau of Commercial Fisheries of the U. S. Department of Interior is cooperating with processors and producers in a program of standards development.

There are five standards for grades of fishery products now in effect: (1) Frozen Fried Fish Sticks, (2) Frozen Fish Blocks, (3) Frozen Raw Breaded Shrimp, (4) Frozen Haddock Fillets, and (5) Frozen Halibut Steaks. The last two standards are newly promulgated; both became effective in March 1959. Two additional standards for frozen fish are being prepared at the laboratories of the Bureau of Commercial Fisheries: one for cod fillets at our Boston laboratory and one for salmon steaks at our Seattle laboratory.

Purpose.--The purpose of the present report is (1) to explain how a processor may have the grade standards applied to his product, (2) to list the requirements that must be met in the standards, and (3) to point out the benefits derived.

How grade standards are applied.--Use of fishery-product-grading-and-inspection service is entirely voluntary on the part of the producer. Two general types of service are available. The first is inspection of a separate lot, for which a certificate of quality and condition is issued but for which grade labelling is not permitted. However, the processor using lot inspection may label the product with the statement: "This package is one of a lot from which samples have been inspected by the U. S. Department of the Interior."

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8.59 PYRUVIC ACID IN THE SKELETAL MUSCLE OF FRESH AND CHILL-STORED, TRAWLED CODLING (GADUS CALLARIAS)

Jones, N. R. (Torry Research Station, Aberdeen, Scotland)
Journal of the Science of Food and Agriculture 10, 472-474 (September 1959)

Introduction.--Pyruvic acid, a product of the last stage of glycolysis in mammalian muscle, is (1) a key compound that yields energy through the tricarboxylic acid cycle and (2) an intermediate in the biosynthesis of alanine. Oxaloacetic acid and α-ketoglutaric acid are intermediates in the tricarboxylic acid cycle and in transamination reactions.

In addition to their purely biochemical interest, the keto-acids possibly could be of some importance in the technology of fish as food. Extensive studies on the muscle volatiles and muscle extractives have shown: (1) that they are the factors determining flavor, (2) that they enter into reactions producing off-flavors and discoloration of the flesh during dehydration and dry-salting as well as during the storage of the products of these processes, and (3) that they are readily-assimilable sources of energy and nitrogen for an invading spoilage microflora. Pyruvic acid, particularly, was a likely participant in some of these actions. In the blood vessels draining mammalian muscle, pyruvic acid levels increase as a result of exercise. Normal pyruvic acid levels of 2.2 milligrams per 100 grams of muscle have been measured in rested rats. Levels in the muscle of trawled fish that are in an exhausted condition and at the point of death could be high enough to contribute appreciably to the pool of compounds that determine the potential of browning by the carbonyl-amino reaction. With the use of a polarograph, Zuman has demonstrated reactions of a type preliminary to browning between pyruvic acid and ammonia, glycine, and alanine in solution. These compounds and other amino compounds capable of reacting with carbonyl compounds are known to be present in muscle from fresh and chill-stored codling.

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 ABSTRACTER: Martin Heerdt

9.6 YEARBOOK OF FISHERY STATISTICS - 1957 INTERNATIONAL TRADE

Gertanbach, L. P. D.
Food and Agriculture Organization of the United Nations, Yearbook of Fishery Statistics 8 (1959) (Rome, Italy)

With this issue, the FAO Fisheries Division resumes the publication of statistics relating to international trade in fishery products. This information was presented last in 1955 in Volume IV, Part 2, which covered the years through 1953.

Each section of the present volume begins with a table summarizing the aggregate imports and exports by country for a specific commodity group. The summary table is followed by a series of synoptic tables, one for each commodity subgroup, showing the flow of exports from the principal exporting countries to the more important destinations.

The seven sections that comprise the bulk of the yearbook are preceded by four general summary tables and followed by various notes and a table of conversion factors.

The coverage of this volume extends to all countries of the world with the exception of a group consisting of the U.S.S.R., mainland China, and other Eastern European and Asian countries that are not members of FAO.

The main sections of the table of contents are as follows:

1. Fish, fresh, chilled, or frozen.

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 ABSTRACTER: Kathryn L. Osterhaug

8.59

Experimental.--Codling, 18 to 24 inches long, were trawl-caught off Aberdeen. They were eviscerated and packed in ice in boxes at an ambient temperature of 2.5° C. under conditions simulating those in a trawler's hold. Batches were removed periodically for immediate analysis. For use as zero-time controls, codling were frozen alive into liquid nitrogen to eliminate autolytic action.

Iced codling were filleted and 10 grams of muscle from the anterio-dorsal part was homogenized in 20 milliliters of 30 percent weight-to-volume trichloroacetic acid. Muscle, which splits off readily along the lines of the muscle blocks, was hammered from frozen zero-time controls and ground with a chilled pestle and mortar before being homogenized in trichloroacetic acid. Homogenates were centrifuged at 1,000 times gravity for 15 minutes at 5° C., and the supernatant extract was stored at -1° C. for analysis. The authors used an adaptation of the mammalian blood procedure of Friedmann and Haugen (1943) for the estimation of pyruvic acid in codling muscle.

Results.--The levels of pyruvic acid in the muscle of trawled codling at death were variable, with a mean of 0.67 milligrams per 100 grams. Mean values fell to 0.36 milligrams per 100 grams after 8 days of storage and then rose rapidly to 0.85 milligrams per 100 grams at 12 days and more slowly to 0.92 milligrams per 100 grams after 18 days of storage. The values fell again to 0.47 milligrams per 100 grams after 21 days of storage. Levels of oxaloacetic acid and α-ketoglutaric acid, as estimated by a variation of the pyruvic acid procedure, were below the limits that permit accurate measurement.

Discussion.--Although the codling had been subjected to severe exercise before death, the amounts of pyruvic acid were considerably lower than those reported in normal mammalian muscle. The amounts of pyruvic acid found in codling muscle are not likely to contribute appreciably to the browning of dehydrated or dry-salted codling. These amounts were small compared with those of glucose and ribose measured in fresh and chill-stored fish. Data are not available to suggest that the keto-acid has an exceptionally high molar browning potential; however, the acid has a strong characteristic smell, and it probably contributes to the flavor of the flesh at the levels detected.

9.6 (Cross Reference: 9.2)

2. Fish, dried, salted, or smoked.
3. Crustaceans and molluscs, fresh, dried, salted, etc.
4. Fish, crustaceans, and molluscs, canned.
5. Fish, crustaceans, and mollusc preparations, not in airtight containers.
6. Aquatic animal oils and fats, crude or refined.
7. Aquatic animal meals and similar products.

8.42

Table 1.--Sodium and potassium content of nine species of Gulf Coast salt-water fish

Common name of fish	Scientific name	Sodium	Potassium
		mg./100 gm.	mg./100 gm.
Salt-water trout	Cynoscion arenarius	54.2	218.4
Red fish	Sciaenops ocellata	54.9	273.0
Gulf King-Whiting	Menticirrhus littoralis	82.8	249.6
Red snapper	Lutjanus aya	64.9	323.0
Drum	Pogonias cromis	50.6	226.2
Flounder	Paralichthys lethostigma	53.9	220.4
Pompano	Trachinotus carolinus	46.8	191.1
Croaker	Micropogon undulatus	87.4	234.0
Sheepshead	Archosargus probatocephalus	101.2	234.0

8.7

The second type of service is continuous in-plant inspection and grading, which allows the processor to indicate on his package the grade assigned to the product.

A processor who wants continuous inspection in his plant makes application to the Bureau of Commercial Fisheries in Washington, D. C. Prior to acceptance of the plant by the Bureau, a preliminary survey is made to determine the potential adequacy of the plant to produce a quality product.

General requirements of standards.--Requirements for certain quality factors are common to all standards. As far as possible, the various quality factors are rated objectively by a numerical scoring system based on 100 points as the highest number attainable. Factors relating to appearance, uniformity, and absence of defects of workmanship are given a numerical score. The magnitude of the score points assigned to the various quality factors reflects the relative importance of each factor to the overall quality and consumer acceptance of the product.

Flavor and odor are considered to be equal in importance to the combined factors that are rated numerically. In fact, a subjective rating of good for flavor and odor is necessary for a Grade A product, and a rating of reasonably good is necessary for a Grade B product, regardless of the numerical score assigned.

One major benefit from the application of standards is to assist in more effective marketing. The packed-under-continuous-inspection seals and grade labels are well known to the consumer. In sales promotions, in advertising, at point of sale, and in product use demonstrations, these Federal inspection symbols can engender favorable consumer response and confidence. Marketing programs can be adjusted to specific consumer demands.

The standards for grades contain criteria and procedures that can be used by any processor to evaluate his own products and to improve his product quality control.

0.38 ACETYLCHOLINESTERASE IN GOLDFISH MUSCLES. STUDIES ON SOME SUBSTRATES AND INHIBITORS

Lundin, S. J. (Research Institute of National Defense, Department 1, Sundbyberg 4, Sweden)
Biochemical Journal 72, 210-214 (June 1959)

An extract from body muscles of goldfish (Carassius auratus) has been shown to contain acetylcholinesterase with the same substrate and inhibitor relationships as acetylcholinesterase preparations from human erythrocytes and from the electric organ of the electric ray (Torpedo ocellata).

0.38 STUDIES ON THE TRYPSIN INHIBITOR OF PYLORIC CAECA I. PREPARATION AND SOME OF ITS PROPERTIES

Kurihara, Michihiko
Bulletin of the Japanese Society of Scientific Fisheries 24, No. 10, 848-851 (1959) (English abstract, tables, and figures)

A trypsin inhibitor has been obtained from the pyloric caeca of bonito. The method of isolation was essentially the same as was used for isolating pancreatic trypsin inhibitor.

1.81 OYSTER FARMING IN AUSTRALIA

Sardone, L. T.
World Fishing 8, 61-63 (September 1959)

(Abstract of this article appears under 9.16 page 19 - January 1960)

1.81 UNUSED OYSTER SHELLS GOOD FOR SEED CULTCH

Anonymous
National Fisherman 40, 7, 28 (September 1959)

Surplus shells washed up on South Caroline river banks suitable renewable resource for seed-oyster production. -- Old oyster shells that are washed up on the banks of South Carolina creeks and rivers by wind and wave action may prove a suitable substitute for steamed-shell cultch. Although the state now has a surplus of cultch from the steam canneries, this may dwindle as an export seed-oyster industry develops.

3.12 DETERMINATION OF ANTIBIOTIC RESIDUE IN FISH

Montefredine, Antonio; Testa, Concetta; and Morelli, Imperia (Pescara Provincial Chem. Lab., Italy)
Boll. lab. chim. provinciali (Bologna) 9, 254-62 (1958)
Chemical Abstracts 53, 14375d (August 10, 1959)

Known biology and chemical methods for estimating antibiotic residue are reviewed. A new method based on the procedures of Tarr, et al. (C. A. 48, 7810e) and Grady and Williams (C. A. 47, 10042a) is described.

3.12 DETERMINATION OF TETRACYCLINE IN FISH PRESERVED WITH ANTIBIOTIC

Montefredine, Antonio; Morelli, Imperia; and Testa, Concetta (Pescara Provincial Chem. Lab., Italy)
Boll. lab. chim. provinciali (Bologna) 9, 263-7 (1958)
Chemical Abstracts 53, 14375g (August 10, 1959)

The microbiological method on a distilled-water extract (C. A. 53, 14375d) was used to determine antibiotic residue on fishes of the Adriatic fauna preserved with tetracycline.

3.12 QUESTIONS AS TO THE AVAILABILITY OF ICE AS CARRIER OF CHEMICAL PRESERVATIVES. AN EXAMINATION WITH CHLORTETRACYCLINE

Higashi, Katsumi; Takatsuka, Noboru; Tawara, Tadashi; Sasano, Yuichi; Fujii, Michiko
Bulletin of the Japanese Society of Scientific Fisheries 24, No. 11, 920-924 (1959) (English abstract, tables, and figures)

Despite the bulk uniformity of distribution of chlortetracycline (CTC) found in a lot of crushed ice, CTC concentration in different melts obtained in the early stages of thawing proved to be higher than the initial bulk concentration. The CTC concentration in successive melts decreased by degrees, and attained one-half of the initial bulk concentration when 40 percent of the ice had melted.

3.12 A PRACTICAL CYLINDER PLATE ASSAY METHOD FOR DETERMINATION OF CHLORTETRACYCLINE IN TISSUES

Tomiyama, Tetuo; Kobayashi, Kunio; and Yone, Yasuo
Bulletin of the Japanese Society of Scientific Fisheries 24, No. 11, 937-942 (1959) (English abstract, figure, and table)

Routine procedures could be greatly simplified by substituting a glass plate for a Petri dish as was reported by Grady and Williams (1953). The relationship of the slope of inhibitory zone to the logarithm of the concentration of CTC remained constant.

ADDRESSES OF PUBLICATIONS ABSTRACTED FOR COMMERCIAL FISHERIES ABSTRACTS

DOMESTIC PUBLICATIONS

Analytical Chemistry
American Chemical Society
20th & Northampton Streets
Easton, Pennsylvania

Archives of biochemistry & Biophysics
Academic Press, Inc.
Prince & Lemon Streets
Lancaster, Pennsylvania

ASHRAE Journal
American Society of Refrigerating and Air-Conditioning Engineers, Inc.
234 Fifth Avenue
New York 1, New York

California Fish and Game
Editor
Department of Fish and Game
722 Capitol Avenue
Sacramento 14, California

Chemical Abstracts
American Chemical Society
20th & Northampton Streets
Easton, Pennsylvania

Chemical and Engineering News
American Chemical Society
20th & Northampton Streets
Easton, Pennsylvania

Chemical Engineering
McGraw-Hill Publishing Co.
330 W. 42nd Street
New York, New York

Chemical Processing
Putman Publishing Co.
111 East Delaware Place
Chicago 11, Illinois

Commercial Fisheries Review
Director, Bureau of Commercial Fisheries
Division of Industrial Research and Services
Fish and Wildlife Service
Department of the Interior
Washington 25, D. C.

Drug and Cosmetic Industry
Drug Markets, Inc.
101 W. 31st Street
New York, New York

Federation Proceedings
Federation of American Societies for Experimental Biology
9650 Wisconsin Street
Washington 14, D. C.

Feed Bag, The
Editorial Service Company
1712 West St. Paul Avenue
Milwaukee 3, Wisconsin

Feedstuffs
Miller Publishing Co.
118 South 6th Street
Minneapolis 2, Minnesota

Fish Boat, The
H. L. Peace Publications
624 Gravier Street
New Orleans 12, Louisiana

Fishing Gazette
Fishing Gazette Publishing Corp.
461 Eighth Avenue
New York, New York

Food Engineering
McGraw-Hill Publishing Co., Inc.
330 W. 42nd Street
New York 18, New York

Food Processing
Putman Publishing Co.
111 East Delaware Place
Chicago 11, Illinois

Food Research
The Garrard Press
510 North Hickory Street
Champaign, Illinois

Food Technology
Institute of Food Technologists
11606 South Bell Avenue
Chicago 43, Illinois

Frosted Food Field
Frosted Food Field, Inc.
19 W. 44th Street
New York 18, New York

Industrial and Engineering Chemistry
American Chemical Society
1155 - 16th Street, N.W.
Washington 6, D. C.

Industrial Refrigeration
Nickerson & Collins Co.
433-435 N. Waller Avenue
Chicago, Illinois

Journal of Agricultural and Food Chemistry
American Chemical Society
20th & Northampton Streets
Easton, Pennsylvania

Journal of the American Chemical Society
American Chemical Society
1155 - 16th Street, N.W.
Washington 6, D. C.

Journal of the American Dietetic Association
American Dietetic Association
620 North Michigan Avenue
Chicago 11, Illinois

Journal of the American Oil Chemists' Society
The American Oil Chemists' Society
35 E. Wacker Drive
Chicago 1, Illinois

Journal of the Association of Official Agricultural Chemists
Association of Official Agricultural Chemists
P. O. Box 540
Benjamin Franklin Station
Washington, D. C.

Journal of Biological Chemistry
The American Society of Biological Chemists, Inc.
Mt. Royal & Guilford Avenues
Baltimore, Maryland

Journal of Nutrition
The Wistar Institute of Anatomy & Biology
36th St. at Spruce
Philadelphia 4, Pennsylvania

Journal of Organic Chemistry
American Chemical Society
20th & Northampton Streets
Easton, Pennsylvania

Maine Coast Fisherman
Maine Coast Fisherman, Inc.
Belfast, Maine

Modern Packaging
Modern Packaging, Corporation
575 Madison Avenue
New York 22, New York

National Fisherman
Atlantic Fisherman, Inc.
Goffstown, New Hampshire

National Provisioner
National Provisioner, Inc.
15 W. Huron Street
Chicago 10, Illinois

Nutrition Reviews
Nutrition Foundation, Inc.
99 Park Avenue
New York 16, New York

Pacific Fisherman
Miller Freeman Publishing, Inc.
500 Howard Street
San Francisco 5, California

Poultry Science
Poultry Science Association
Kansas State College
Manhattan, Kansas

Progressive Fish-Culturist
U. S. Department of the Interior
Bureau of Sport Fisheries and Wildlife
Fish and Wildlife Service
Washington 25, D. C.

Quick Frozen Foods
E. W. Williams Publishing, Inc.
82 Wall Street
New York 5, New York

Science
American Association for the Advancement of Science at the Business Press
1515 Massachusetts Avenue, N.W.
Washington 5, D. C.

Seafood Merchandising
H. L. Peace Publications
624 Gravier Street
New Orleans 9, Louisiana

Western Canner/Packer
The Canner Publishing Co.
817 West Market Street
Louisville, Kentucky

Western Feed & Seed
Western States Publications
320 Market Street
San Francisco 11, California

FOREIGN PUBLICATIONS

Analyst, The
14 Belgrave Square
London, S.W., 1, England

Annual Report of the Fisheries Research Board of Canada
Fisheries Research Board of Canada
Ottawa, Ontario, Canada

Biochemical Journal, The
Cambridge University Press
Bentley House
200 Euston Road
London, N.W., 1, England

Biochemistry
(Publication of the Academy of Sciences of the USSR)
Consultants Bureau, Inc.
227 W. 17th Street
New York 11, New York

Bulletin of the Japanese Society of Scientific Fisheries
Japanese Society of Scientific Fisheries
c/o Tokyo Suisan Daigaku
Shiba-kaigandori 6-Chome
Tokyo, Japan

Bulletin of the Faculty of Fisheries, Hokkaido University
Faculty of Fisheries
Hokkaido University
Hakadote, Japan

Canadian Fisherman
National Business Publications, Ltd.
Gardenvale, Quebec, Canada

Canadian Journal of Biochemistry & Physiology
Division of Administration and Awards
National Research Council
Ottawa 2, Ontario, Canada

Canadian Journal of Chemical Engineering
The Chemical Institute of Canada
18 Rideau Street
Ottawa 2, Ontario, Canada

Canadian Journal of Chemistry
Division of Administration and Awards
National Research Council
Ottawa 2, Ontario, Canada

Chemistry & Industry
14 Belgrave Square
London, W., 1, England

Fette-Seifen-Anstrichmittel
Industrieverlag von Hernhaussen KG
Hamburg 11, West Germany

Fisheries Newsletter
Commonwealth Director of Fisheries, Department of Primary Industry
Canberra, Australia

Food Manufacture
Leonard Hill, Ltd.
Eden Street
London, N.W., 1, England

Food Preservation Quarterly
Division of Food Preservation and Transport
Commonwealth Scientific and Industrial Research Organization
Sydney, Australia

Journal of Applied Chemistry
The Society of Chemical Industry
14 Belgrave Square
London, S.W., 1, England

Journal of the Fisheries Research Board of Canada
University of Toronto Press
Ottawa, Ontario, Canada

Journal of the Science of Food and Agriculture
The Society of Chemical Industry
14 Belgrave Square
London, S.W., 1, England

Modern Refrigeration
Maclaren House
131 Great Suffolk Street
London, S.E., 1, England

Nature
MacMillan & Co., Ltd.
St. Martin's Street
London, W.C., 2, England

Norwegian Fishing News
Kaigaten 8
P. O. Box 222
Bergen, Norway

Progress Reports of Atlantic Coast Stations
Fisheries Research Board of Can.
St. Andrews, New Brunswick, Can.

Progress Reports of Pacific Coast Stations
Technological Station
898 Richards Street
Vancouver 2, B. C., Canada

Report of the Food Investigation Board (Great Britain)
Department of Scientific and Industrial Research
Charles House
5-11 Regent Street
London, S.W., 1, England

Trade News
Director of Information and Educational Service
Department of Fisheries
Ottawa, Ontario, Canada

Western Fisheries
Roy Wrigley Publications, Ltd.
1104 Hornby Street
Vancouver 1, B.C., Canada

World Fisheries Abstracts
FAO Fisheries Division
Technology Branch
Viale delle Terme di Caracalla
Rome, Italy

World Fishing
John Trundell, Ltd.
St. Richards House
Eversholt Street
London, N.W., 1, England

3.2345 CALORIMETRIC STUDIES ON THE FREEZING OF SEA-FISH

Riedel, L.
Kaltetech. 8, 374-377 (1956)
Food Science Abstracts 29, 212 (June 1957)

3.2345 DETERMINATION OF THE TIME REQUIRED FOR FREEZING WHALEMEAT

Tanaka, K. and Nishimoto, J.
Bulletin de L'Institut International du Froid, 10th International Congress of Refrigeration (Paris) 39, 902, 904 (1959)

A formula was derived to determine the freezing time of a block of whale meat.

3.6 CONTINUOUS HIGH VACUUM DRYING TECHNIQUES

Fixari, F.; Conley, W.; and Bard, G. (Chain Belt Company, Milwaukee, Wisconsin)
Food Technology 13, 217-220 (March 1959)

The continuous dehydrator is used for materials which are oxidation-heat sensitive, or that require cooling to prevent caramelization after the drying process. It has found acceptance in the drying of materials such as: coffee, orange juice, grapefruit juice, and citrus vitamin P. It is presently under development for other materials such as: tomato products, chemicals, and pharmaceuticals.

3.6 DEHYDRATED EDIBLE FISH PROTEINS

Vogel, Raimund and Mohler, Klement
U. S. 2,875,061 (Feb. 24, 1959)
Chemical Abstracts 53, 14381c (August 10, 1959)

4.0 FIFTY YEARS OF FATTY ACID APPLICATIONS

Harwood, H. J. (Armour and Company, Chicago, Illinois)
Journal of the American Oil Chemists' Society 36, 432-434 (September 1959)

4.0 FIFTY YEARS OF PROGRESS IN THE TECHNOLOGY OF EDIBLE FATS AND OILS

Robinson, H. E. and Mattil, K. F. (Swift and Company, Chicago, Illinois)
Journal of the American Oil Chemists' Society 36, 434-436 (September 1959)

4.0 PROGRESS IN THE CHEMISTRY OF LIPIDES IN SOUTH AFRICA IN THE PAST FIFTY YEARS

Horn, D. H. S. (National Chemical Research Laboratory, Pretoria, South Africa) and Sutton, Donald A. (South African Institute for Medical Research, Johannesburg, South Africa)
Journal of the American Oil Chemists' Society 36, 424-427 (September 1959)

Topics include: vegetable oils, sebaceous secretions, cutin, autoxidation of methyl linoleate, polymerization of oils, and medical biochemistry.

6.133 RECOVERY OF OIL AND PROTEINS FROM ANIMAL MATERIAL

Borck, Alfred E. G. (to Aktiebolaget Separator)
U. S. 2,888,449 (May 26, 1959)
Chemical Abstracts 53, 16563b (September 10, 1959)

Press water obtained from marine animals is passed through two centrifuges to separate sludge and part of the oil in the second centrifuge. The resulting press water and the remaining oil are passed through several evaporation stages. During passage of the partially concentrated press water between the first and last evaporation stages, it is centrifuged to remove sludge and oil separately.

6.133 REFINED SHARK-LIVER OIL AND VITAMIN A CONCENTRATES

Mahdihassan, S.; Moinuddin, Mohammad; Ali, Syed M.; and Haq, Syed A.
Brit. 810,643 (Mar. 18, 1959)
Chemical Abstracts 53, 15604d (August 25, 1959)

A process is described for the simultaneous production of refined shark-liver oil and vitamin A concentrates, as well as recovery of calcium salts of fatty acids.

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7.522 GIANT NERVE FIBERS OF THE SQUID. I. FRACTIONATION OF DIALYZABLE CONSTITUENTS OF AXOPLASM AND QUANTITATIVE DETERMINATION OF THE FREE AMINO ACIDS

Deffner, Gottfried G. J. and Hafter, Reimar E. (Massachusetts Inst. of Technol., Cambridge)
Biochim. et Biophys. Acta 32, 362-74 (1959) (In English)
Chemical Abstracts 53, 14361b (August 10, 1959)

7.522 SEPARATION OF DERIVATIVES OF AMINO ACIDS BY USING GAS-LIQUID CHROMATOGRAPHY

Bayer, E. (Inst. Org. Chem., Karlsruhe, Germany)
Gas. Chromatog. 1958, 333-9
Chemical Abstracts 53, 16261i (September 10, 1959)

Methyl esters of amino acids are separated by gas-liquid chromatography. Silicone grease containing lithium, sodium, potassium, copper, nickel, or iron caproate is used as a coating for the column packing.

7.522 DETERMINATION OF AMINO ACIDS IN BIOLOGICAL MATERIAL V. THE SEPARATION OF MULTIPLE MIXTURES OF NINHYDRIN-POSITIVE COMPOUNDS BY MEANS OF GRADIENT ELUTION ON ION-EXCHANGE COLUMNS

Krampitz, G. and Muller, R. (Univ. Bonn, Ger.)
Z. Tierphysiol. Tierernahr. u. Futtermittelk. 14, 114-28 (1959)
Chemical Abstracts 53, 18146e (October 10, 1959)

7.89 POLAROGRAPHIC STUDIES ON FISH MUSCLE MEATS

Fukushima, Kiyoshi; Osakabe, Isami; Kikuchi, Takeaki; and Okada, Ikunosuke
J. Tokyo Univ. Fisheries 43, 173-8 (1957) (In English)
Chemical Abstracts 52, 18950 (November 10, 1958)

The -SH groups of muscle from mackerel, bonito, and carp increased slowly as the tissues were incubated at 35°.

7.89 IDENTIFICATION BY MICROELECTROPHORESIS OF SMALL QUANTITIES OF SYNTHETIC COLORING MATTER OF FOODS

Legrand, P. Ph.
Ann. fals. et fraudes 52, 5-12 (1959)
Chemical Abstracts 53, 8261i (May 10, 1959)

7.89 COPPER CHLORIDE CRYSTALLIZATION TEST FOR THE DETECTION OF AGING AND DECOMPOSITION OF MEAT, FISH, AND MILK

Kraus, H. (Vet. Hochschule, Hannover, Ger.)
Arch. Lebensmittelhyg. 10, 35-40 (1959)
Chemical Abstracts 53, 15391c (August 25, 1959)

8.51 CHEMICAL STUDIES ON THE RED MUSCLE (CHAI) OF FISHES VII. ELECTROPHORETIC CHARACTERISTICS OF RED MUSCLE MYOGLOBIN AND BLOOD HEMOGLOBIN

Matsuura, Fumio and Hashimoto, Kanehisa
Bulletin of the Japanese Society of Scientific Fisheries 23, No. 4, 222-226 (1957) (English abstract, figures, and table)

Metmyoglobin prepared from the red muscle of tuna, (Parathunnus sibi) was analyzed electrophoretically by means of the Tiselius apparatus and found to be homogeneous except around the iso-electric point, pH 6.8. The electrophoretic mobility of tuna metmyoglobin is very small in phosphate buffer at pH 7.3. The mobility of tuna metmyoglobin is about one-half of horse, one-seventh of carp, and one-fifth of turtle metmyoglobin. The iso-electric point of tuna metmyoglobin occurred at pH 6.8.

VIII. Preparation of crystalline cytochrome C from the red muscle of tunny-fish. -- Ibid. 24, No. 3, 216-220 (1958). Crystalline cytochrome C was prepared from the red muscle of tuna, Neothunnus macropterus, by the method of Hagihara. The iron content of this preparation was found to be 0.487 percent. Spectral characteristics agreed fairly well with those for amorphous cytochrome. Electrophoretic experiments revealed a general resemblance of the pH-mobility curve of tuna cytochrome C to that of horse, beef, pig, and chicken. The iso-electric point was found to be pH 10.2.

XI. Amino acid composition of tuna myoglobin. -- Ibid. 24, Nos. 6 and 7, 563-566 (1958)

8.6170 A NEW NATURAL SOURCE OF VITAMIN A

Pradhan, A. S. K.; Marathe, V. G.; and Arsiwala, S. M.
J. sci. industr. Res., India 15C, 218-220 (1956)
Food Science Abstracts 29, 218 (June 1957)

8.6170 VITAMIN A COMPONENTS OF FISH LIVERS: DETERMINATION AND ORIGIN

Lambertsen, G. and Braekkan, O. R. (Govt. Vitamin Lab., Bergen, Norway)
Biochim. Problems Lipids, Proc. Intern. Conf., 2nd Ghent 1955, 56-63 (Pub. 1956)
Chemical Abstracts 53, 7446g (April 25, 1959)

Analysis by the maleic anhydride method of 40 samples of liver oils obtained from 31 species of fishes indigent to Norwegian waters showed neovitamin A to be essentially absent. Vitamin A was therefore believed to be stored in the fish liver in the trans form, and the commonly reported values of 35 percent for neovitamin A were due to isomerization of vitamin A. During the handling and processing of the liver samples, storage of livers at 6° prior to isolation of the oil resulted in increased neovitamin A.

8.6170 FAT AND VITAMIN A IN THE INTESTINE OF LAMPREY ENTOSPHENUS JAPONICUS MARTENS

Yamada, Juami (Tokai Regional Fisheries Research Laboratory)
Bulletin of the Japanese Society of Scientific Fisheries 24, No. 11, 943-946 (1959) (English abstract and tables)

United States
Department of the Interior
Fish and Wildlife Service
Bureau of Commercial Fisheries
Washington 25, D. C.

Official Business